

APPENDIX 5C: Q1 2005 MATERIAL PRICING ANALYSIS

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APPENDIX 5C: MATERIAL PRICING ANALYSIS FOR FIRST QUARTER 2005

Core steel is one of the major cost drivers of a distribution transformer and is fundamentally linked to the efficiency of the finished transformer. When looking at energy conservation standards for distribution transformers, it is important to understand core steel pricing and influences on that pricing. The Department received several comments on the ANOPR analysis that material prices, and particularly core steel, were experiencing a rapid increase. Therefore, in addition to its analysis on a five year average material price (2000 through 2004), the Department conducted a “current price” scenario of the first quarter 2005. The results of the five year average are presented in Chapter 5 of the TSD. The results of the current price scenario are presented in this appendix.

Section 5C.3 of this Appendix presents the life-cycle cost results for the first quarter 2005 material price scenario and compares these results to the 2000-2004 average material price scenario. Chapter 8 of the TSD provides more detailed life-cycle cost results for the 2000-2004 average material price scenario. Chapter 8 also presents the Department’s sensitivity analyses conducted on various LCC inputs, including material prices. In Chapter 8, the Q1 2005 material price is referred to as the “high” price scenario and the 2000-2004 average price scenario is called the “medium” price scenario. The Department also created a “low” price scenario in order to establish a lower bound for the LCC sensitivity analysis. The low price scenario is based on material prices in 2002 (the calendar year with the lowest \$/pound for M6 core steel) and reduces all the material prices in that year by 15%. These material prices can be found in the material price tables in Chapter 5 and the low-price scenario manufacturer selling prices can be found in the LCC spreadsheets.

5C.1 MATERIAL PRICING TABLES

The Department completed a supplementary engineering analysis using first quarter 2005 material prices. The following table presents the five-year average and Q1 2005 material prices used for liquid-immersed units.

Table 5C.1.1 Liquid-Immersed Material Prices Used in the Engineering Analyses

Material	Q1 2005 \$/lb.	5-Year Average \$/lb.
M2 core steel	1.71	0.95
M3 core steel	1.63	0.80
M4 core steel	1.56	0.76
M6 core steel	1.42	0.70
ZDMH (mechanically-scribed core steel, finished core)	2.75	1.47
SA1 (amorphous) - finished core, volume production	2.50	1.80
Copper wire, formvar, round #10-20	2.25	1.55
Copper wire, enameled, round #7-10 flattened	2.21	1.51
Copper wire, enameled, rectangular sizes	2.65	1.76
Aluminum wire, formvar, round #9-17	1.56	1.43
Aluminum wire, formvar, round #7-10	1.58	1.46
Copper strip, thickness range 0.020-0.045	2.92	2.32
Copper strip, thickness range 0.030-0.060	2.84	2.24
Aluminum strip, thickness range 0.020-0.045	1.66	1.54
Aluminum strip, thickness range 0.045-0.080	1.69	1.45
Kraft insulating paper with diamond adhesive	1.56	1.59
Tank Steel	0.50	0.35
Mineral oil	2.40	1.71

Likewise, the Department used material prices from the first quarter of 2005 to conduct an additional engineering analysis for dry-type units. The following table presents the five-year average and Q1 2005 material prices used in both engineering analyses for dry-type units.

Table 5C.1.2 Dry-Type Material Prices Used in the Engineering Analyses

Material	Q1 2005 \$/lb.	5-Year Average \$/lb.
H-O DR core steel (laser-scribed)	1.85	0.99
M3 core steel	1.63	0.80
M4 core steel	1.56	0.76
M5 core steel	1.47	0.72
M6 core steel	1.42	0.70
M19 core steel (26 gauge)	0.82	0.56
M36 core steel (29 gauge)	0.69	0.50
M36 core steel (26 gauge)	0.65	0.45
M43 core steel (26 gauge)	0.58	0.43
Copper wire, rectangular 0.1 x 0.2, Nomex wrapped	2.69	2.00
Aluminum wire, rectangular 0.1 x 0.2, Nomex wrapped	2.05	2.06
Copper strip, thickness range 0.020-0.045	2.92	2.32
Aluminum strip, thickness range 0.020-0.045	1.66	1.54
Nomex insulation	18.00	18.11
Cequin insulation	12.00	11.99
Impregnation (per gallon)	19.00	17.80
Enclosure steel	0.50	0.35
Winding combs	10.00	10.24

The Department used the same markup percentages for both engineering analyses, including markups of 2.5 percent for the scrap factor, 4 percent for additional scrap due to the core steel mitring process, 12.5 percent for factory overhead, and 25 percent for non-production costs.

5C.2 Q1 2005 MATERIAL PRICE ENGINEERING ANALYSIS RESULTS

This section provides a visual representation of the results of the Q1 2005 material pricing analysis. The scatter plots in this section show the relationship between the manufacturer's selling price and efficiency relationships for each of the 13 design lines. Each dot on the plots represents one unique design created by the software at a given manufacturer's selling price and efficiency

level. The placement of each dot (and the uniqueness of each design) is dictated by the design option combinations (core steel and windings), core shape, and A/B combination.

Additional scatter plots within each subsection illustrate the manufacturer selling price delta between transformer designs using 2000-2004 average material prices and Q1 2005 material prices. Each scatter plot also visually presents the candidate standard levels chosen for consideration by the Department, for that particular design line.

5C.2.1 Design Line 1 Engineering Analysis Results

Figure 5C.2.1 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 1. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

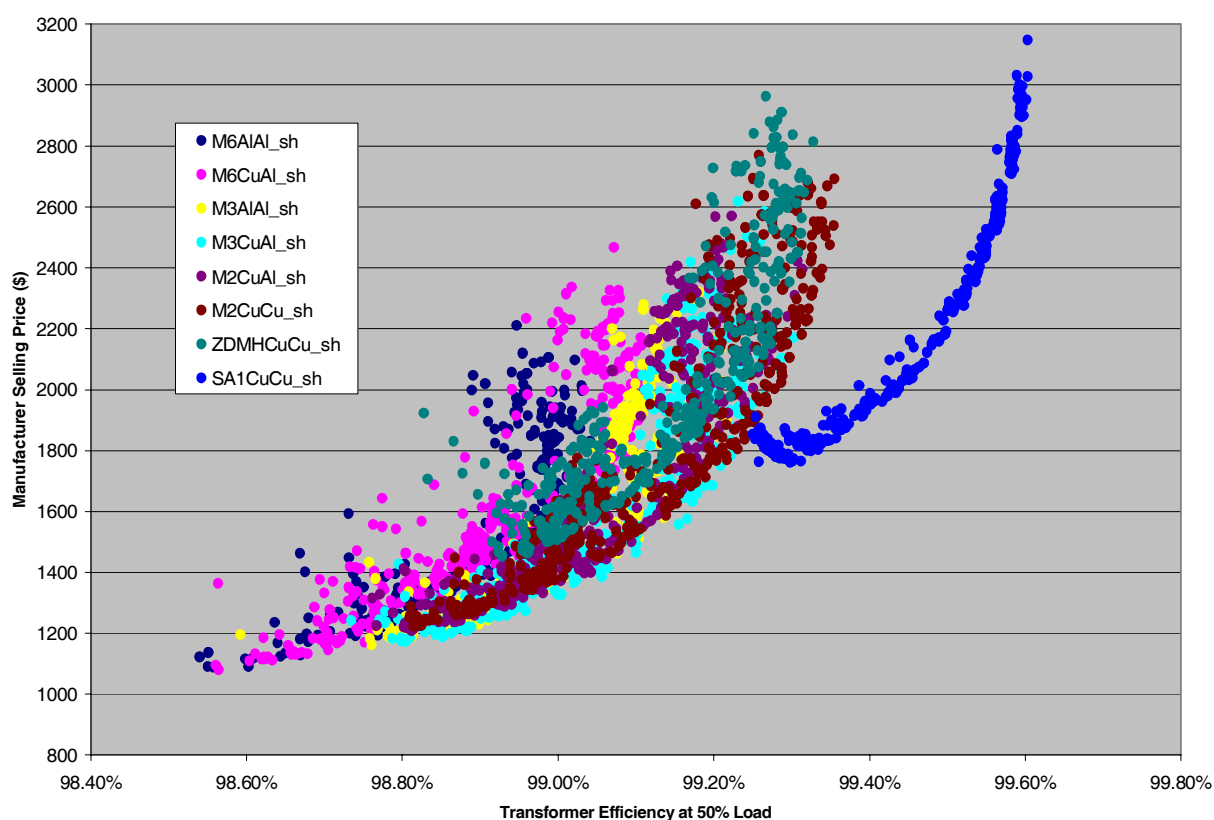


Figure 5C.2.1 Price and Efficiency for Q1 2005 Material Price Scenario, DL 1

Figure 5C.2.2 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 1 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

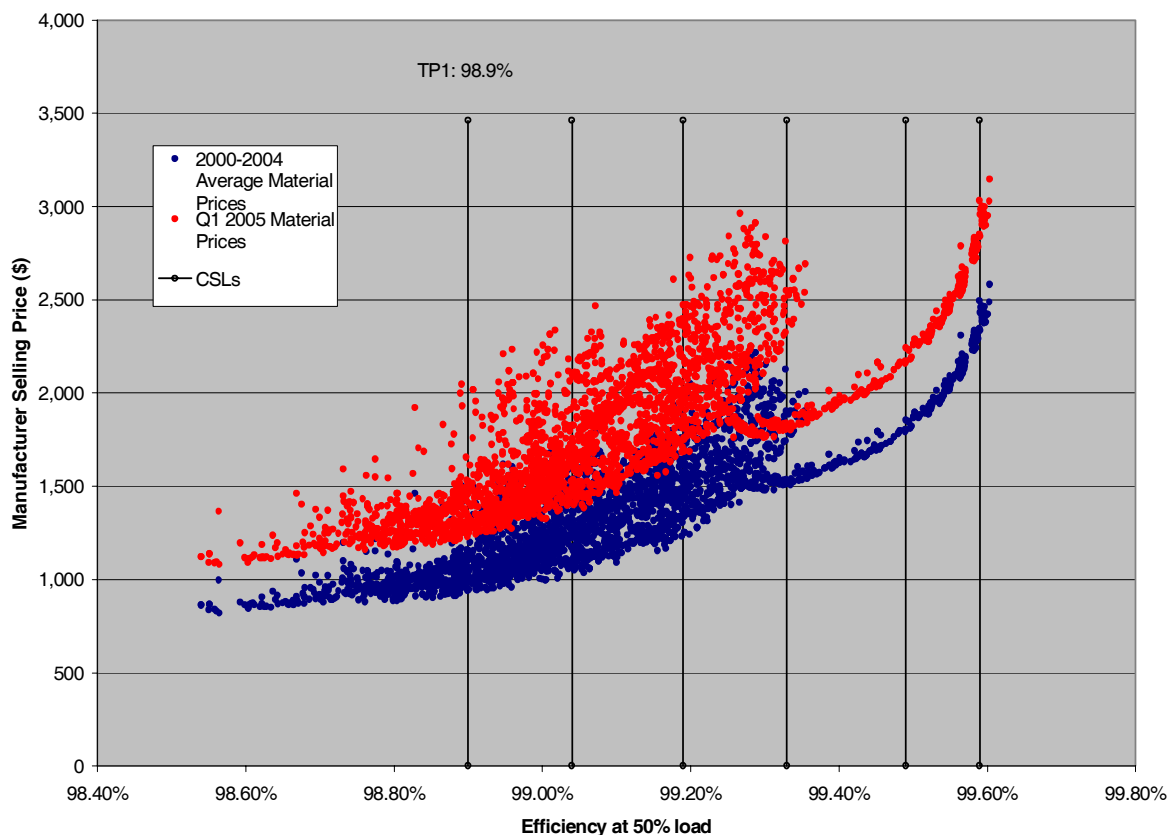


Figure 5C.2.2 Material Price Scenarios Comparison Plot for Design Line 1

5C.2.2 Design Line 2 Engineering Analysis Results

Figure 5C.2.3 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 2. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

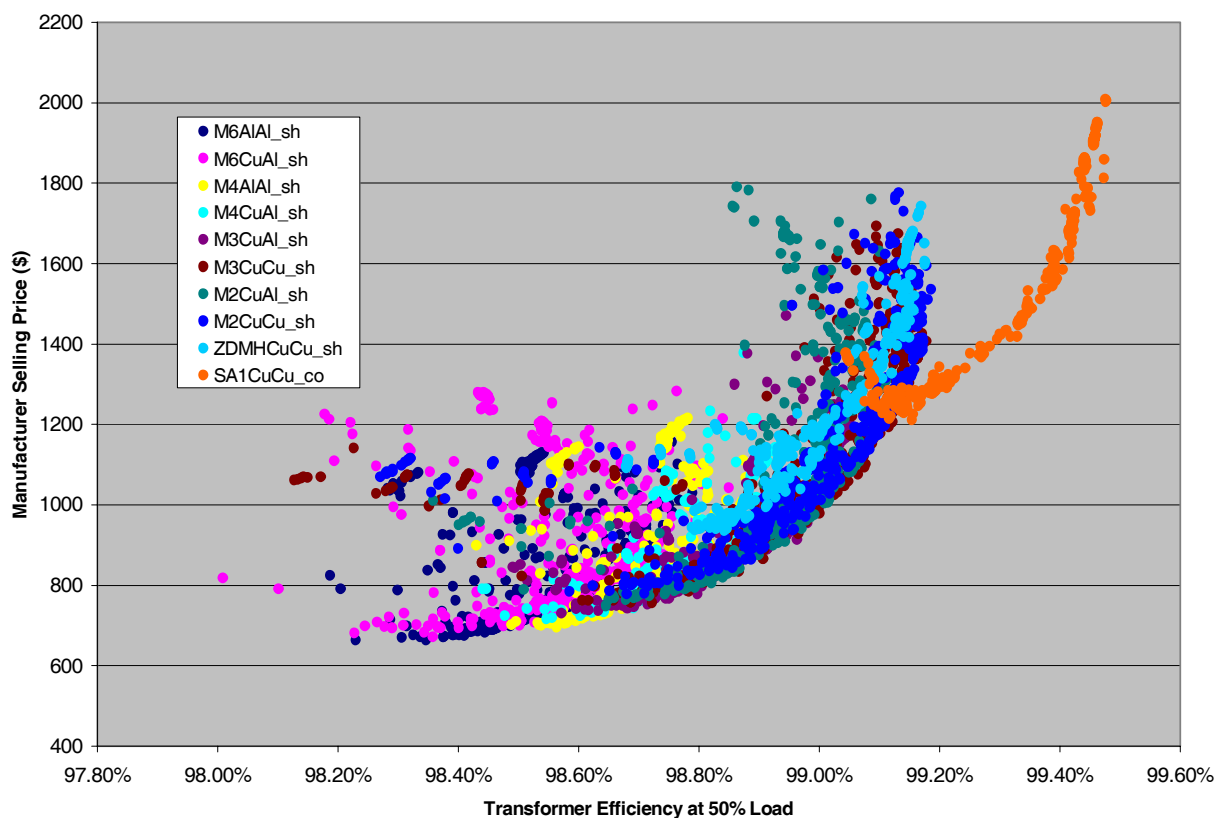


Figure 5C.2.3 Price and Efficiency for Q1 2005 Material Price Scenario, DL 2

Figure 5C.2.4 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 2 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

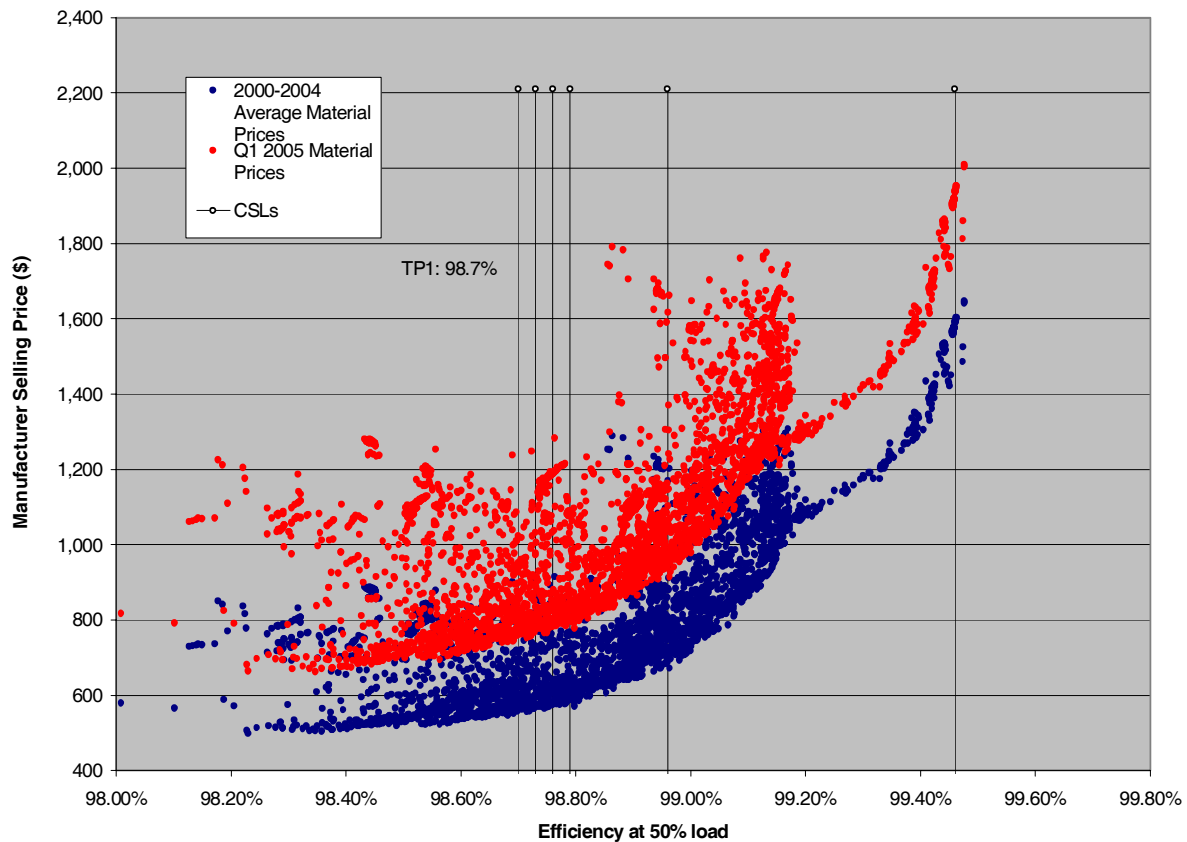


Figure 5C.2.4 Material Price Scenarios Comparison Plot for Design Line 2

5C.2.3 Design Line 3 Engineering Analysis Results

Figure 5C.2.5 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 3. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

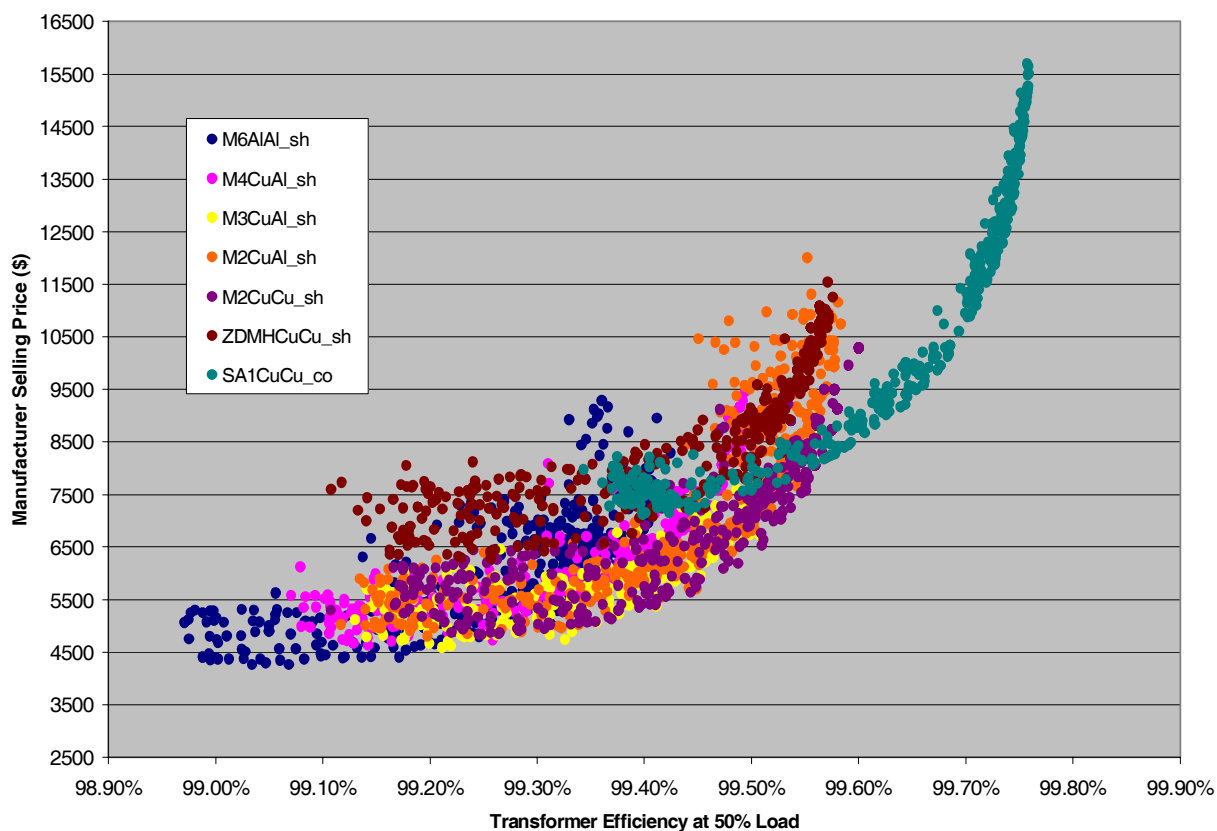


Figure 5C.2.5 Price and Efficiency for Q1 2005 Material Price Scenario, DL 3

Figure 5C.2.6 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 3 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

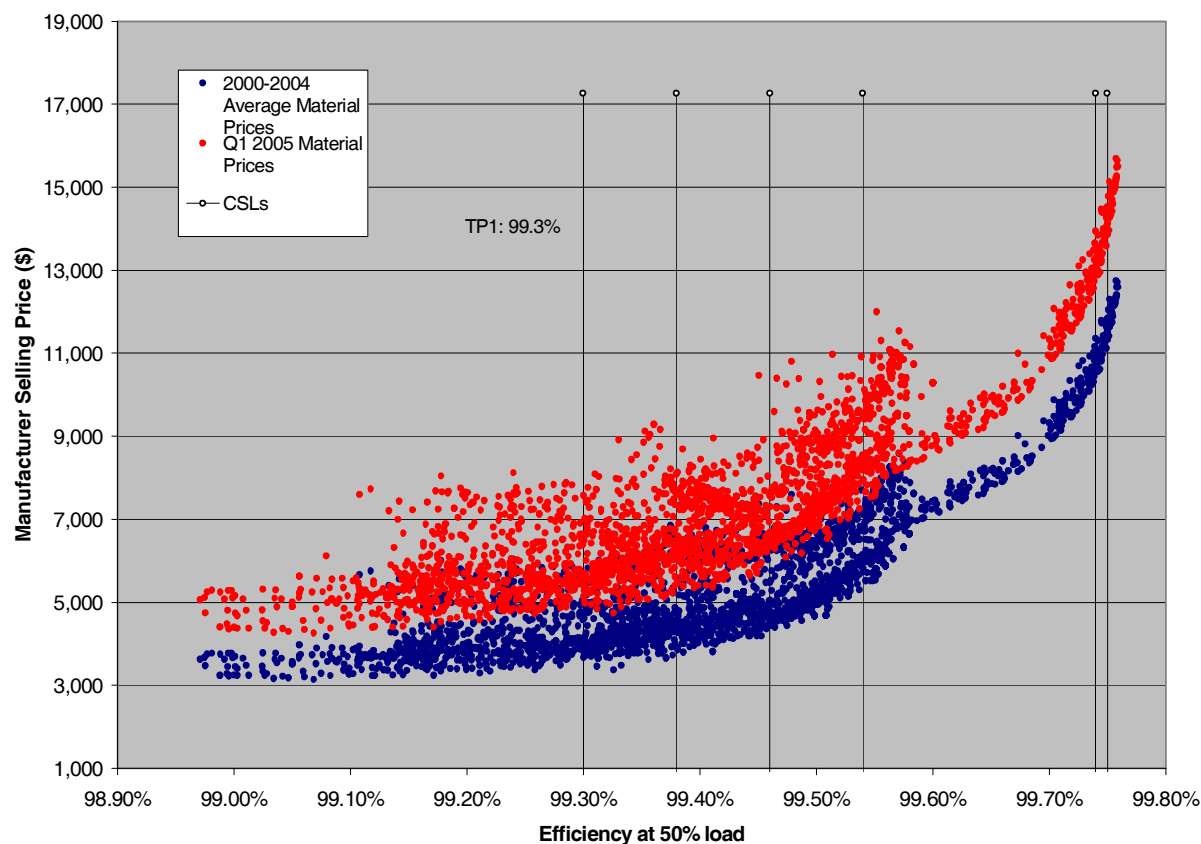


Figure 5C.2.6 Material Price Scenarios Comparison Plot for Design Line 3

5C.2.4 Design Line 4 Engineering Analysis Results

Figure 5C.2.7 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 4. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

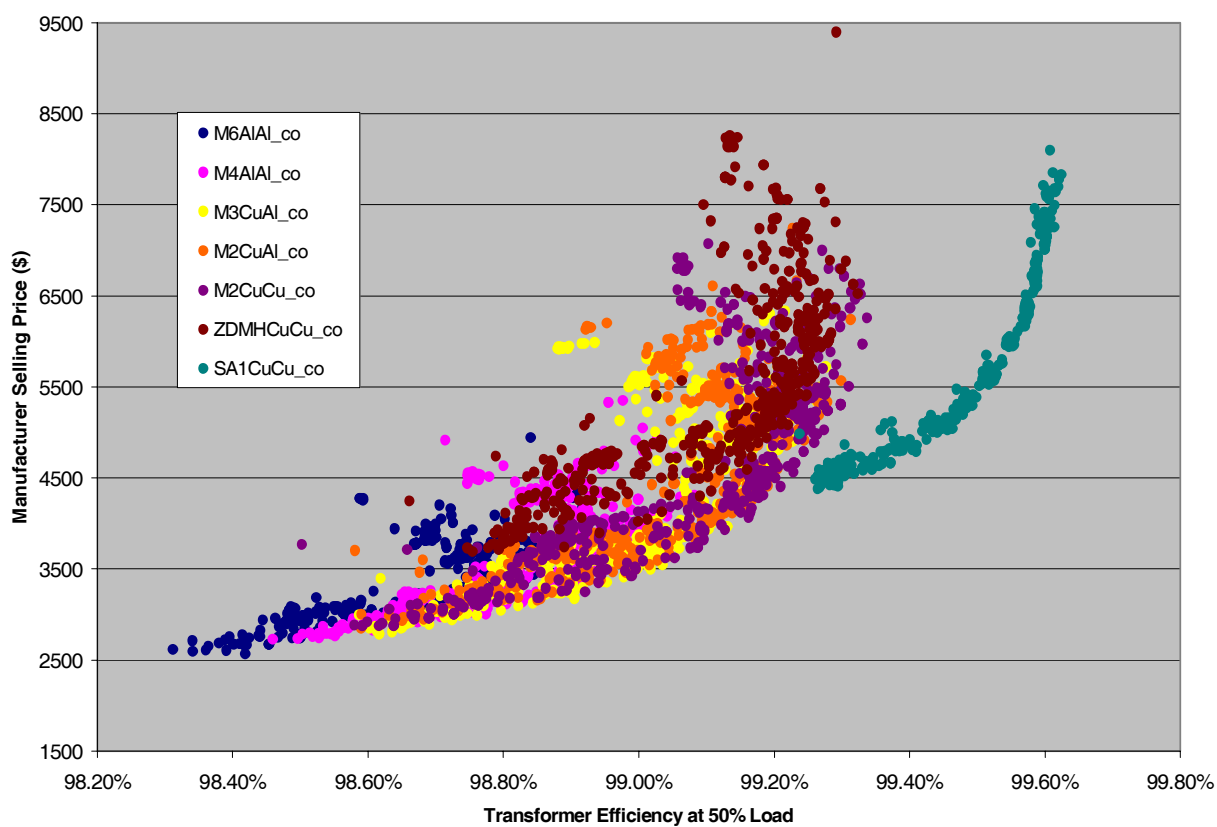


Figure 5C.2.7 Price and Efficiency for Q1 2005 Material Price Scenario, DL 4

Figure 5C.2.8 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 4 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

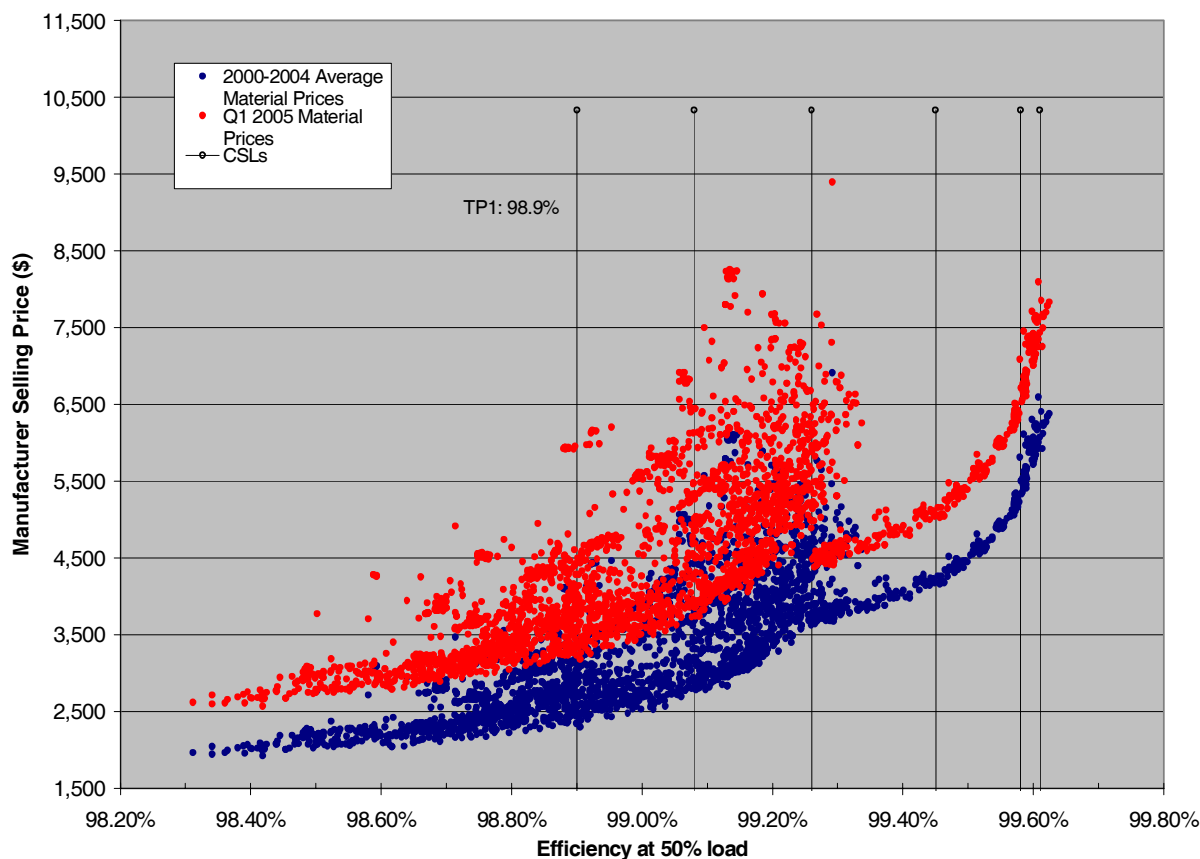


Figure 5C.2.8 Material Price Scenarios Comparison Plot for Design Line 4

5C.2.5 Design Line 5 Engineering Analysis Results

Figure 5C.2.9 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 5. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

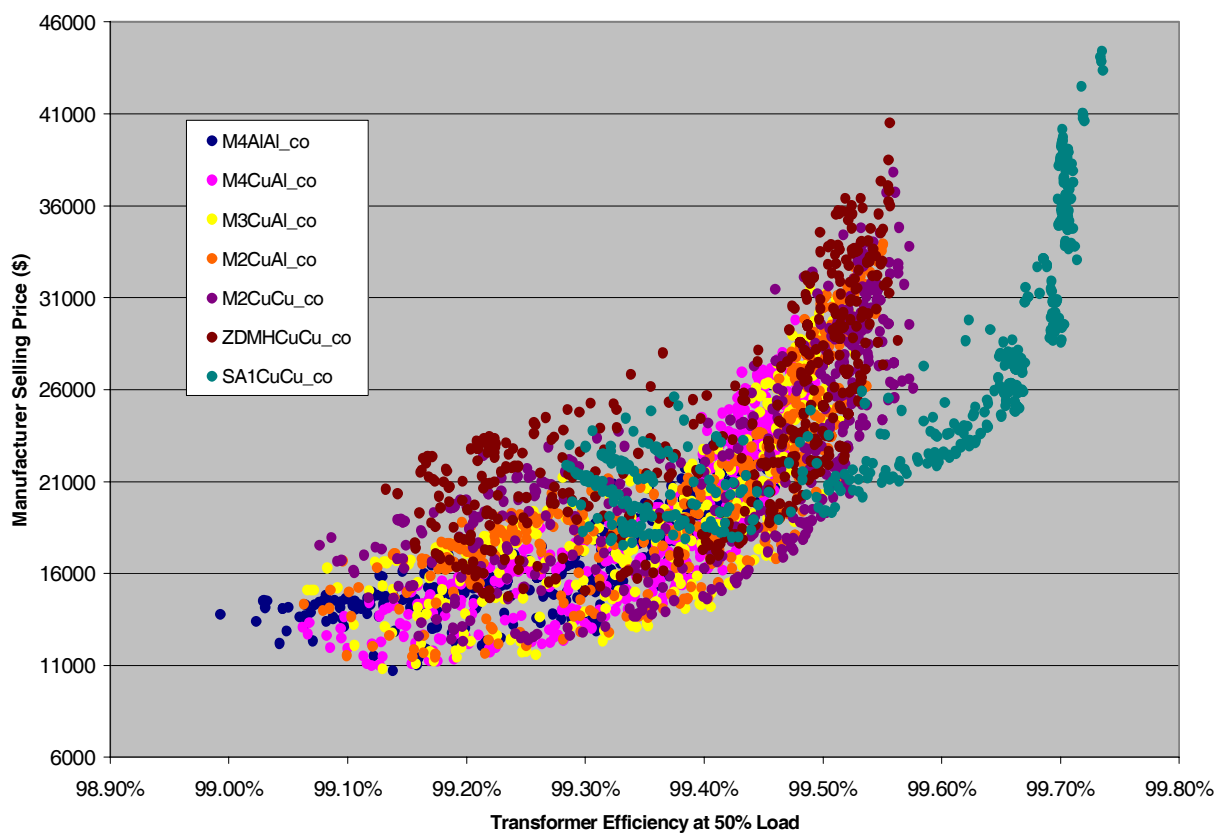


Figure 5C.2.9 Price and Efficiency for Q1 2005 Material Price Scenario, DL 5

Figure 5C.2.10 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 5 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

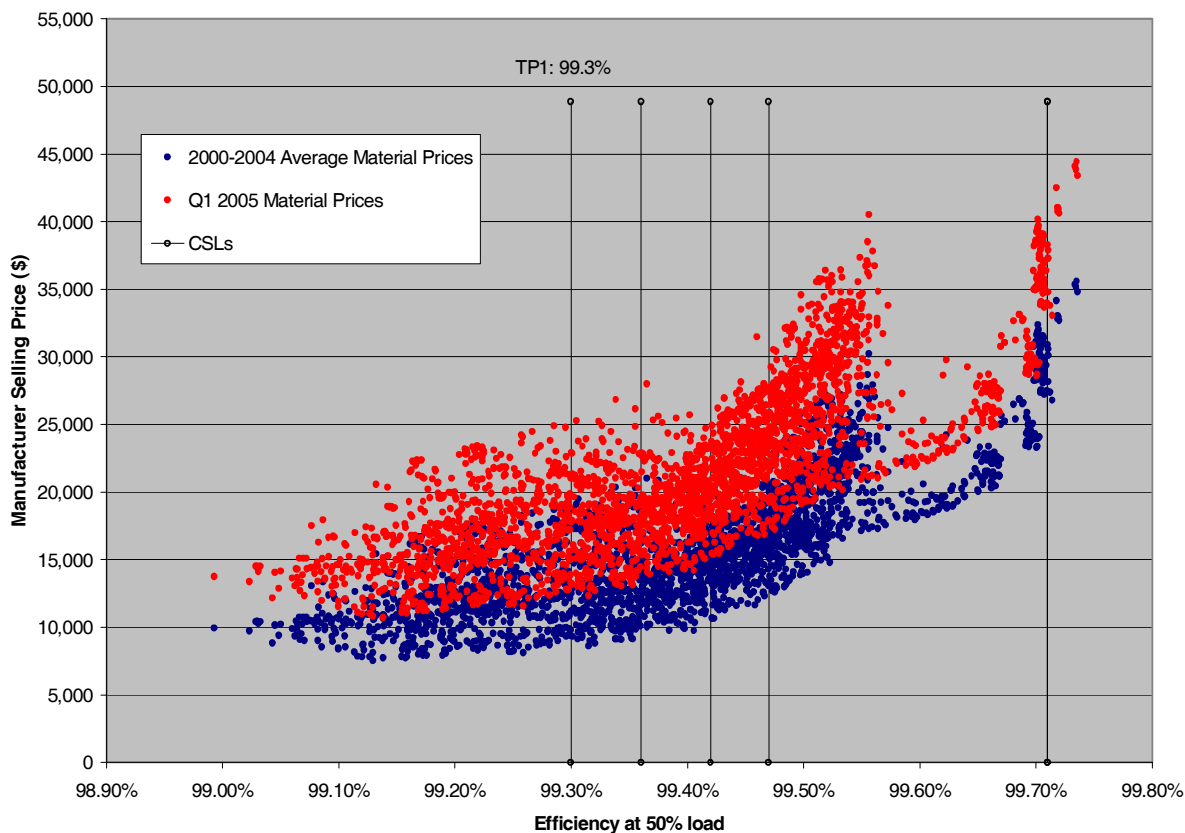


Figure 5C.2.10 Material Price Scenarios Comparison Plot for Design Line 5

5C.2.6 Design Line 6 Engineering Analysis Results

Figure 5C.2.11 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 6. The efficiency levels shown in this plot represent transformers at 35 percent of nameplate load and are corrected for temperature.

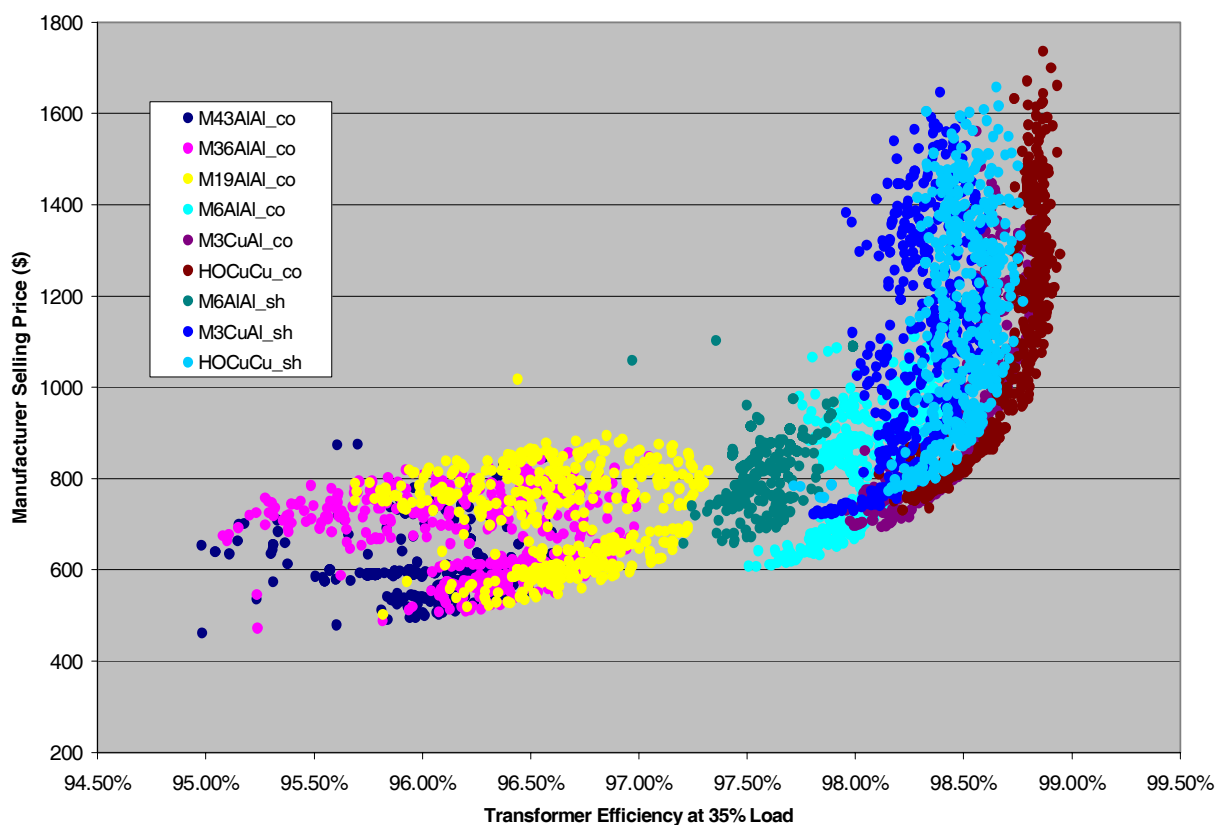


Figure 5C.2.11 Price and Efficiency for Q1 2005 Material Price Scenario, DL 6

Figure 5C.2.12 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 6 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 35 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

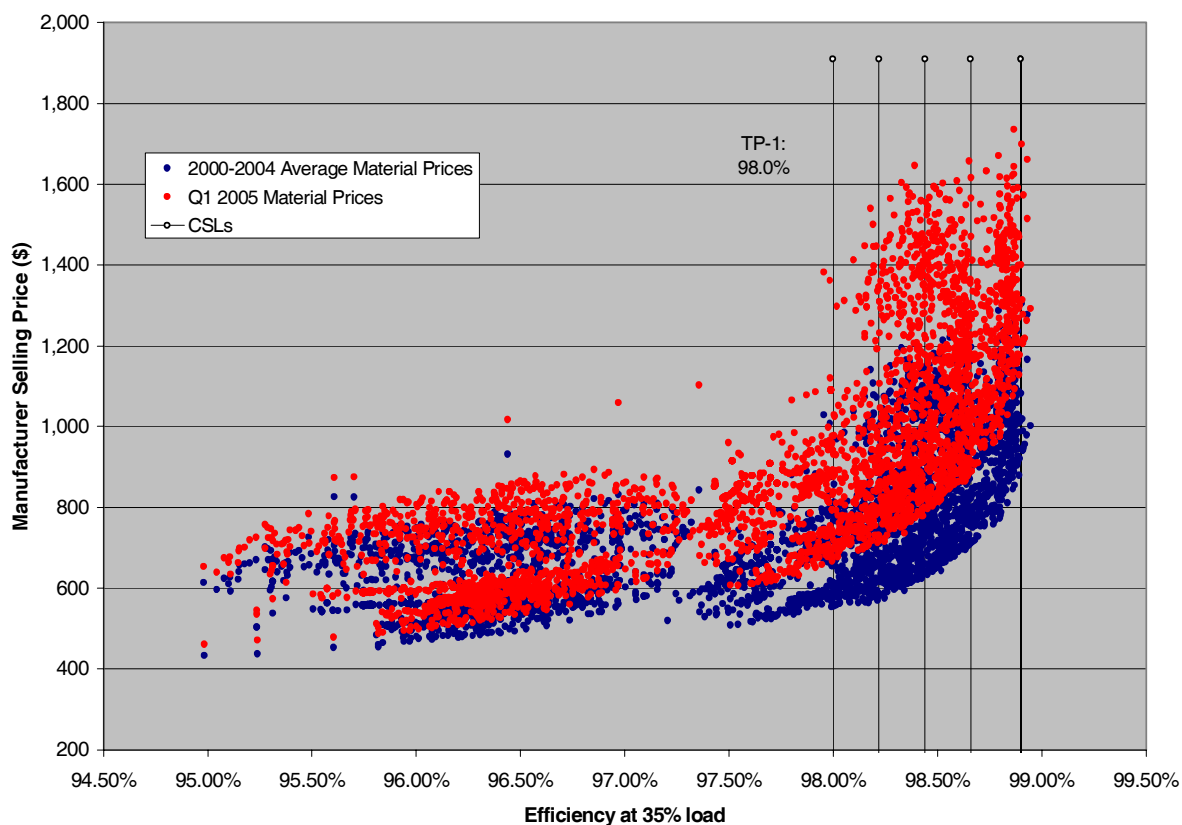


Figure 5C.2.12 Material Price Scenarios Comparison Plot for Design Line 6

5C.2.7 Design Line 7 Engineering Analysis Results

Figure 5C.2.13 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 7. The efficiency levels shown in this plot represent transformers at 35 percent of nameplate load and are corrected for temperature.

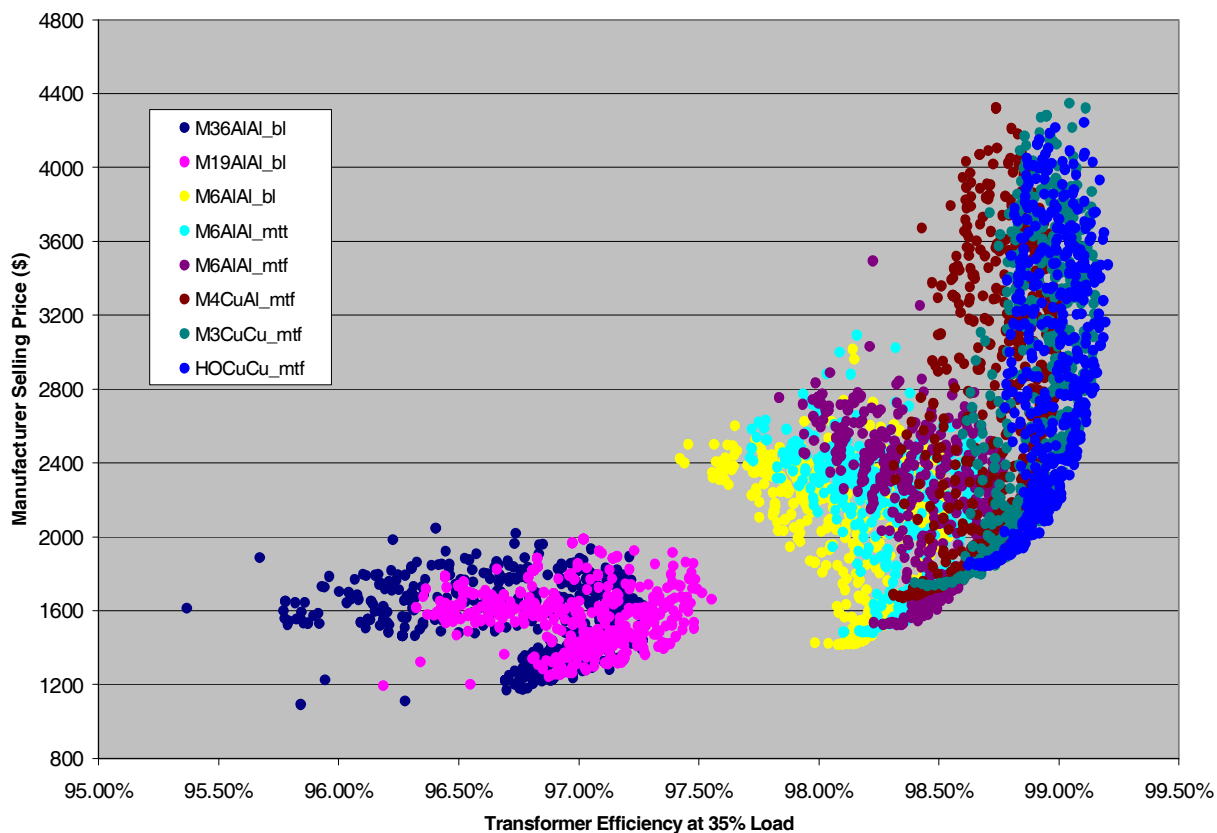


Figure 5C.2.13 Price and Efficiency for Q1 2005 Material Price Scenario, DL 7

Figure 5C.2.14 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 7 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 35 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

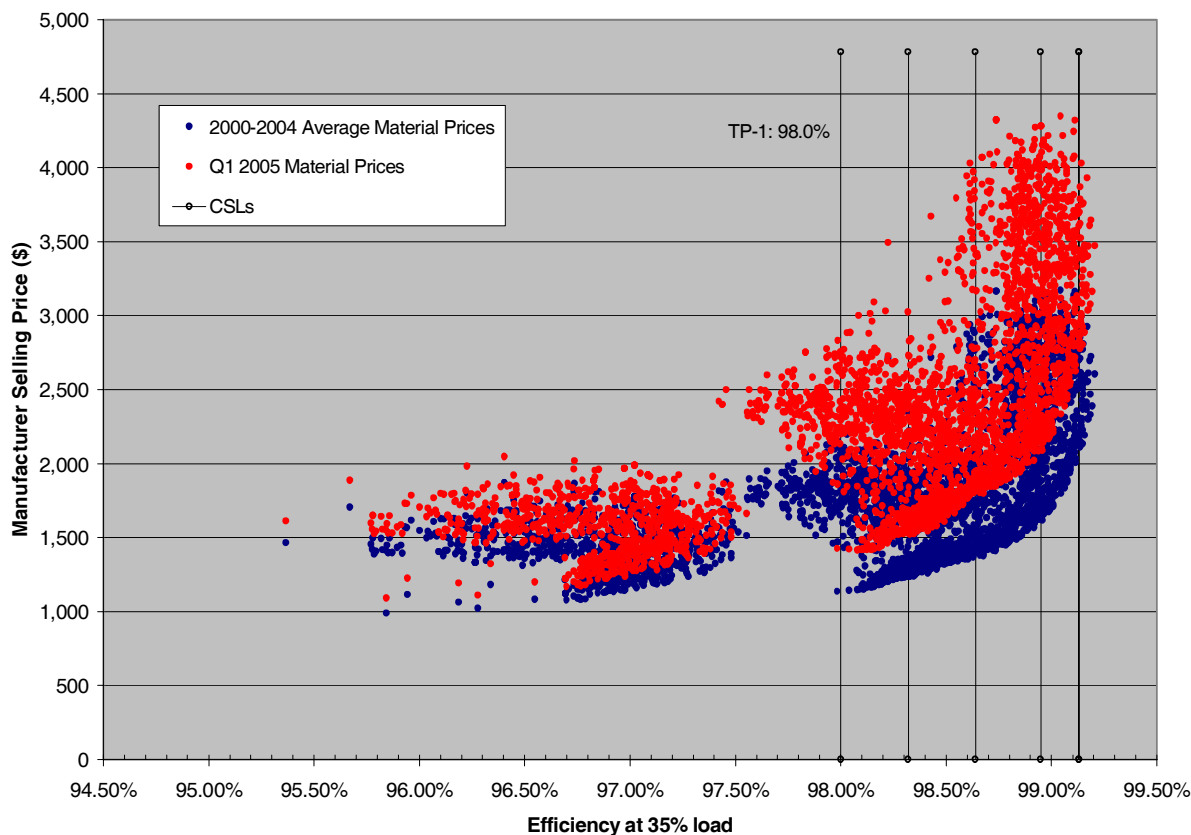


Figure 5C.2.14 Material Price Scenarios Comparison Plot for Design Line 7

5C.2.8 Design Line 8 Engineering Analysis Results

Figure 5C.2.15 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 8. The efficiency levels shown in this plot represent transformers at 35 percent of nameplate load and are corrected for temperature.

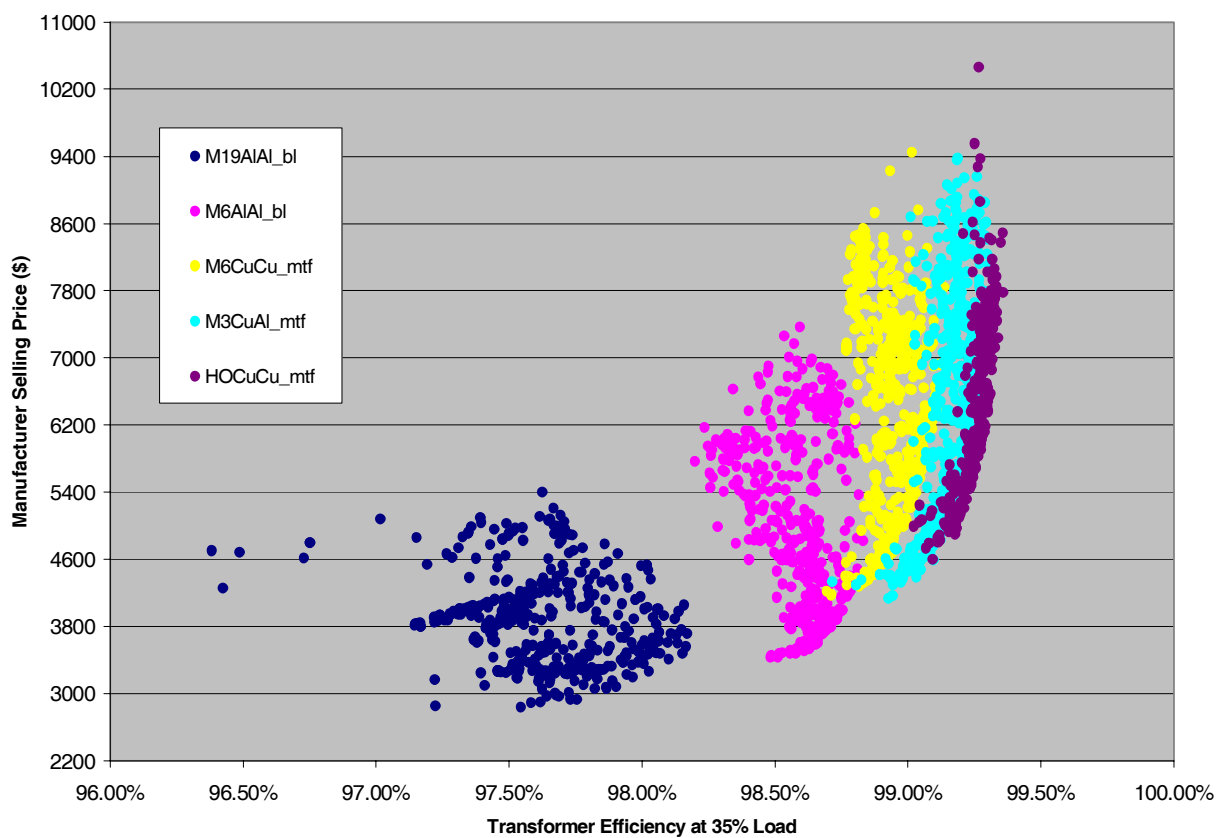


Figure 5C.2.15 Price and Efficiency for Q1 2005 Material Price Scenario, DL 8

Figure 5C.2.16 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 8 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 35 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

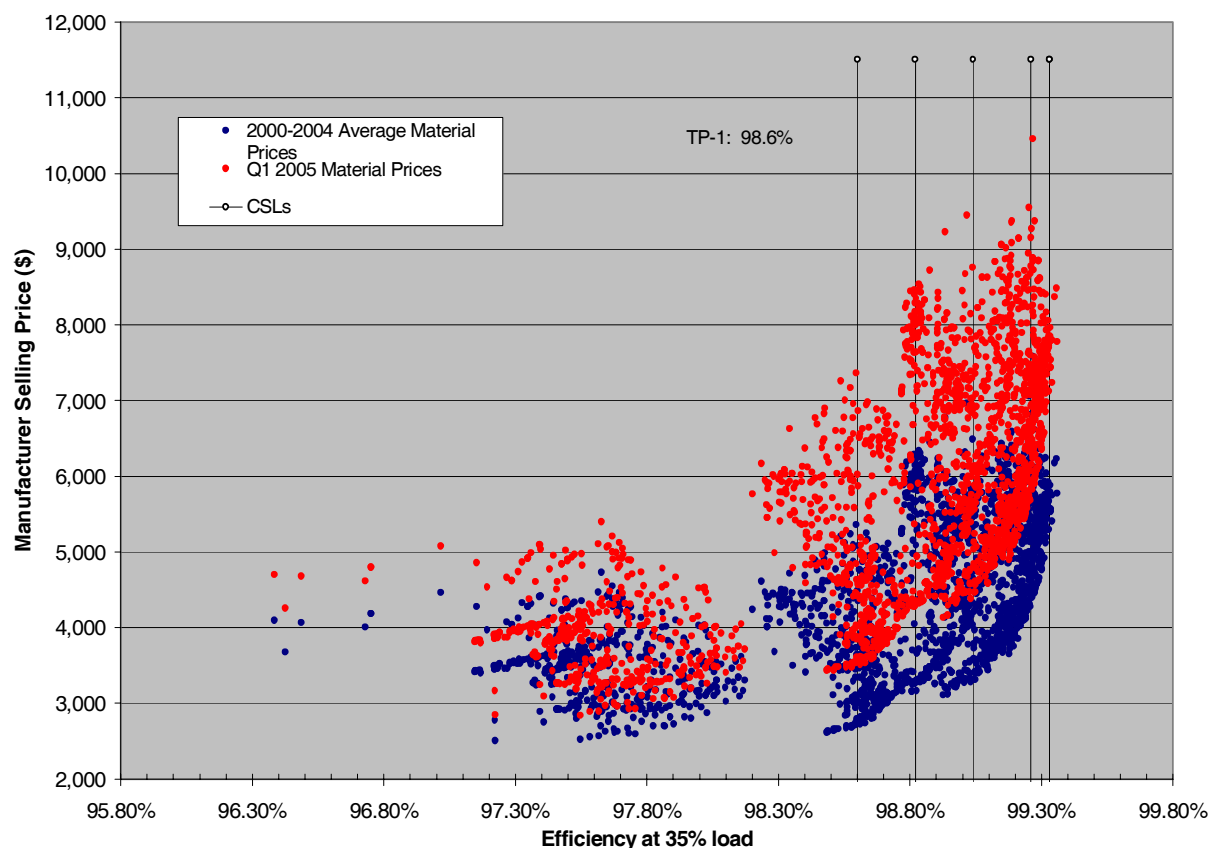


Figure 5C.2.16 Material Price Scenarios Comparison Plot for Design Line 8

5C.2.9 Design Line 9 Engineering Analysis Results

Figure 5C.2.17 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 9. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

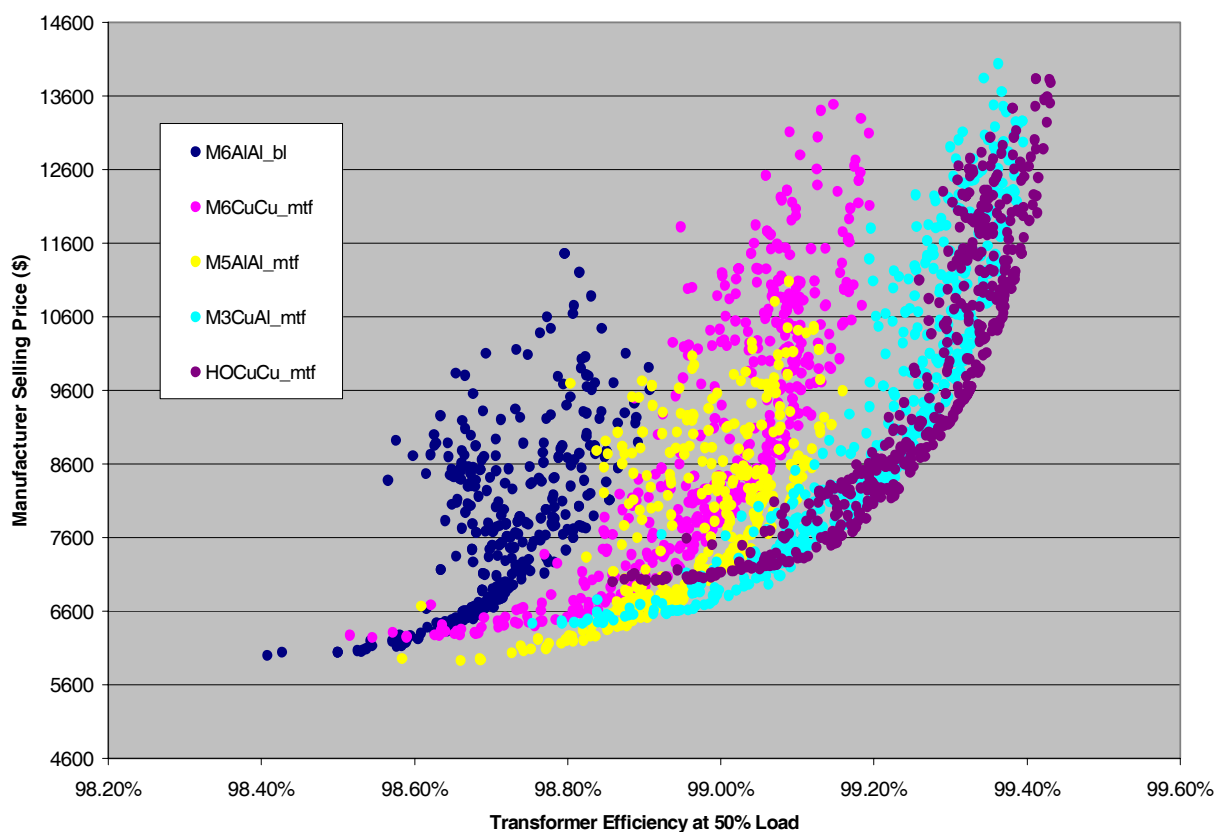


Figure 5C.2.17 Price and Efficiency for Q1 2005 Material Price Scenario, DL 9

Figure 5C.2.18 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 9 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

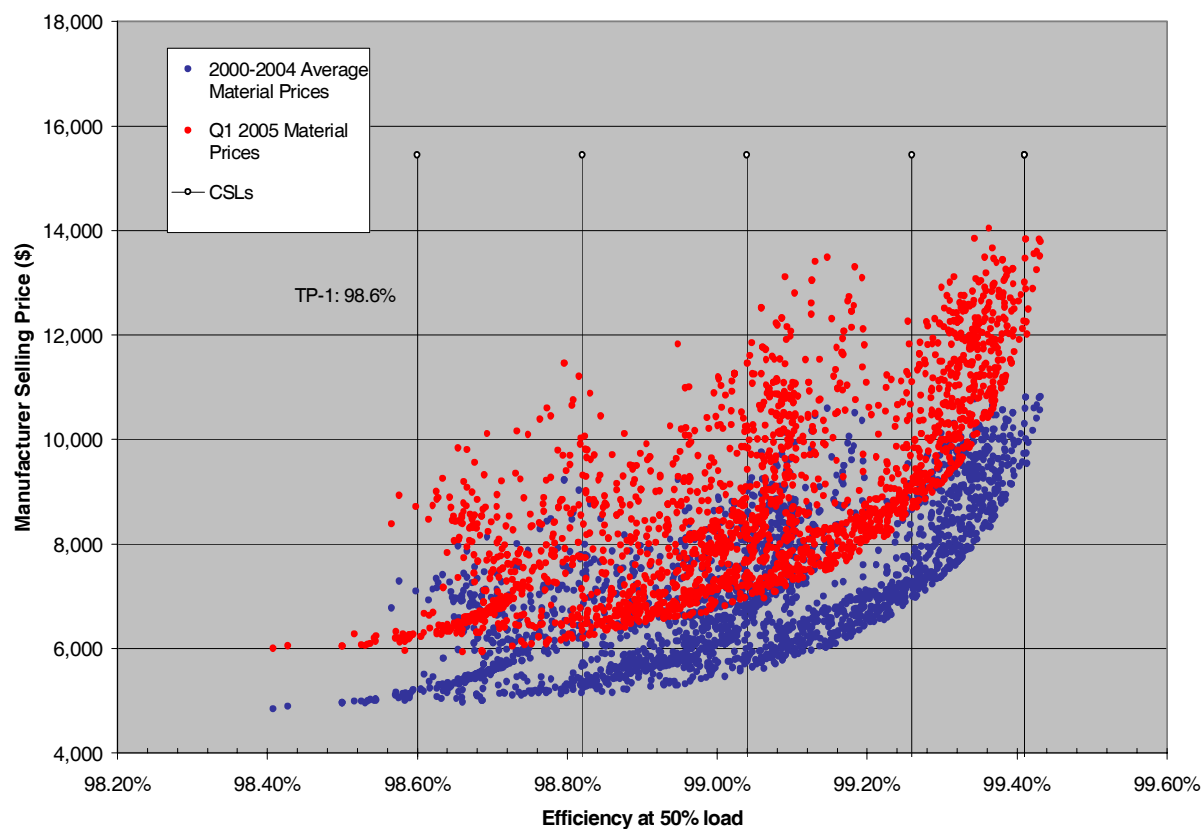


Figure 5C.2.18 Material Price Scenarios Comparison Plot for Design Line 9

5C.2.10 Design Line 10 Engineering Analysis Results

Figure 5C.2.19 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 10. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

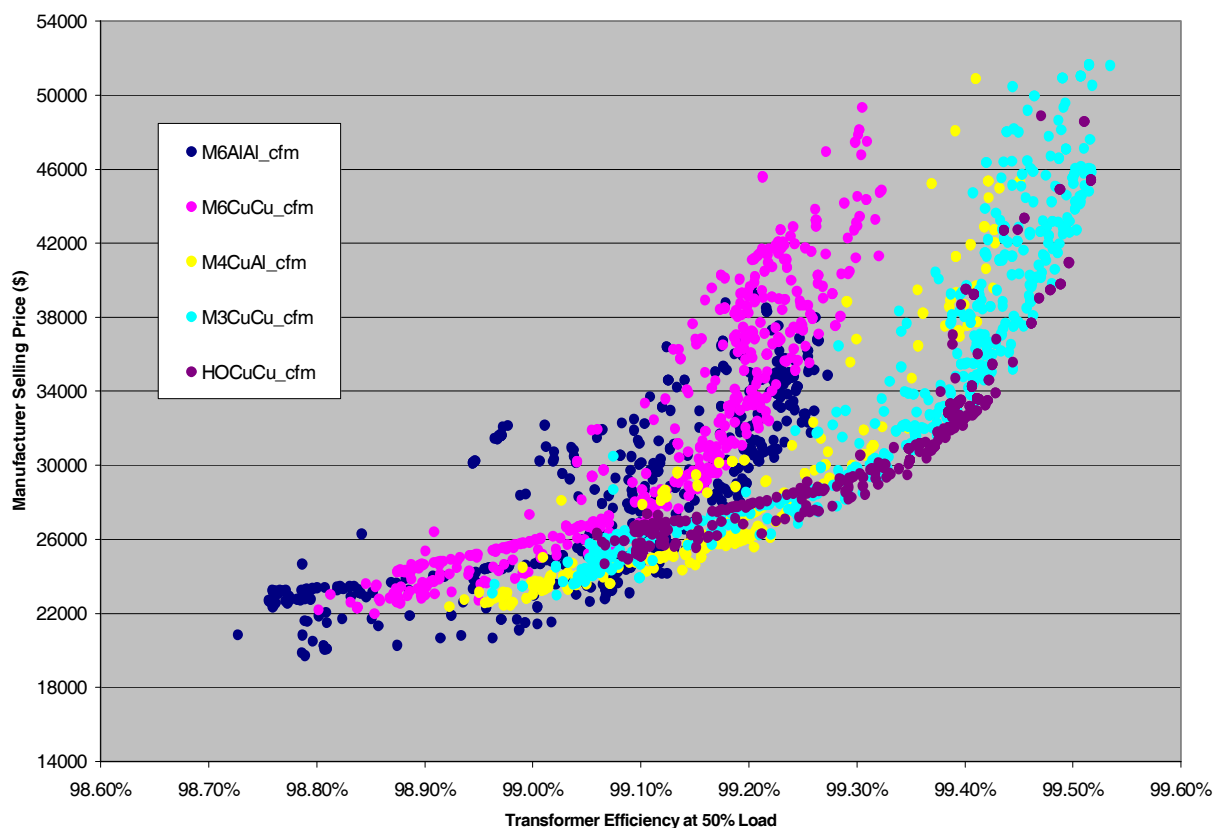


Figure 5C.2.19 Price and Efficiency for Q1 2005 Material Price Scenario, DL 10

Figure 5C.2.20 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 10 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

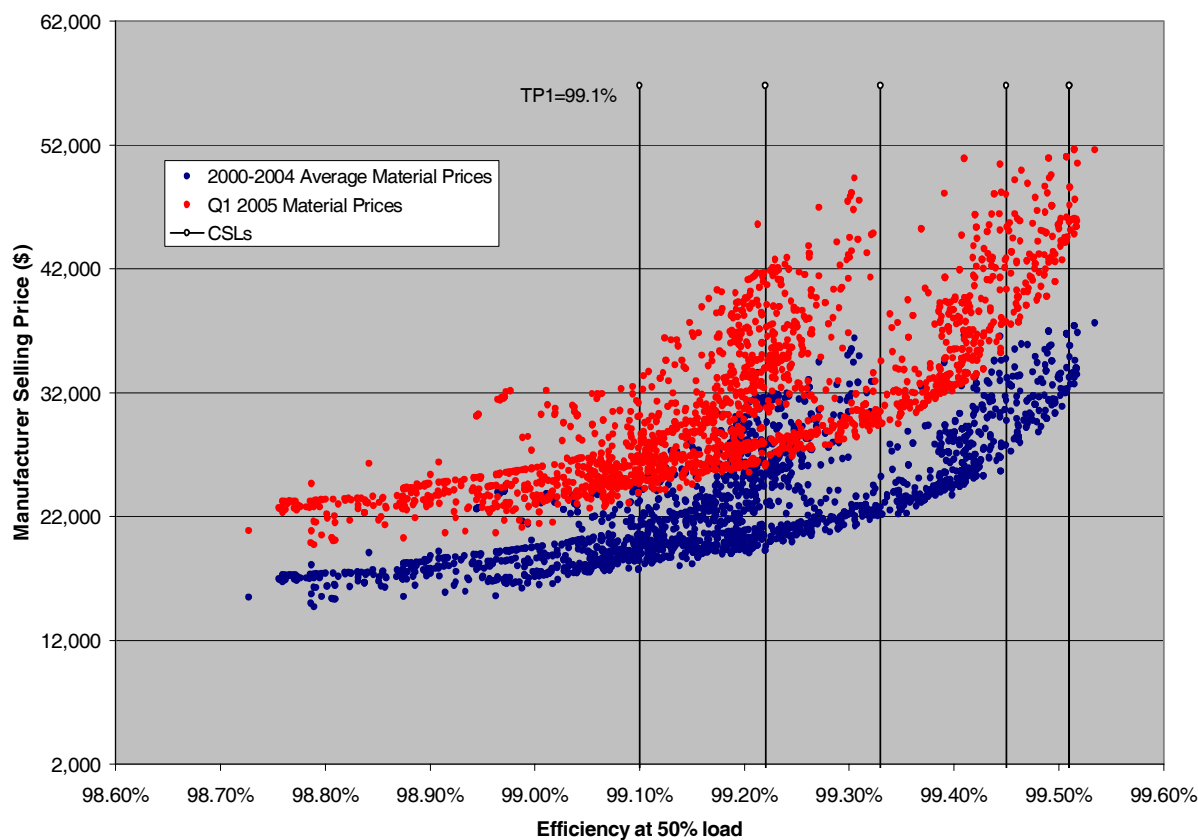


Figure 5C.2.20 Material Price Scenarios Comparison Plot for Design Line 10

5C.2.11 Design Line 11 Engineering Analysis Results

Figure 5C.2.21 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 11. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

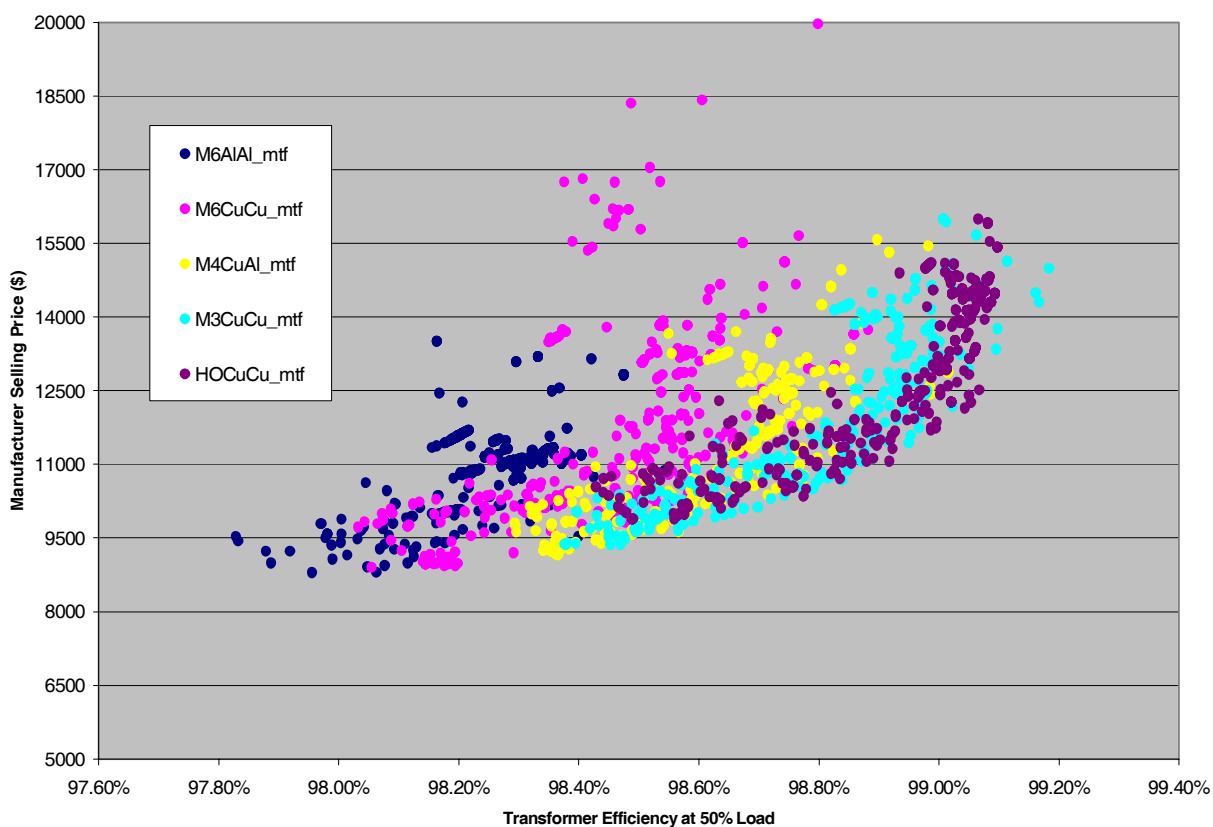


Figure 5C.2.21 Price and Efficiency for Q1 2005 Material Price Scenario, DL 11

Figure 5C.2.22 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 11 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

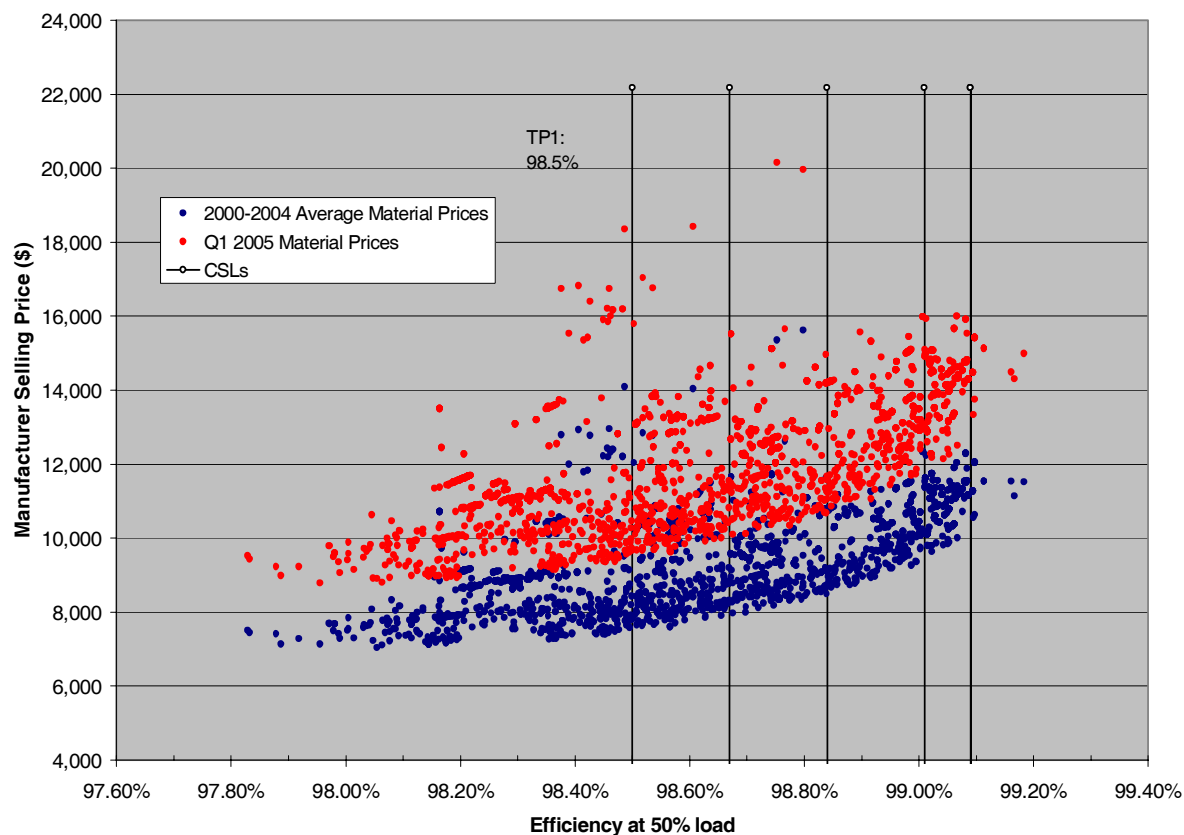


Figure 5C.2.22 Material Price Scenarios Comparison Plot for Design Line 11

5C.2.12 Design Line 12 Engineering Analysis Results

Figure 5C.2.23 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 12. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

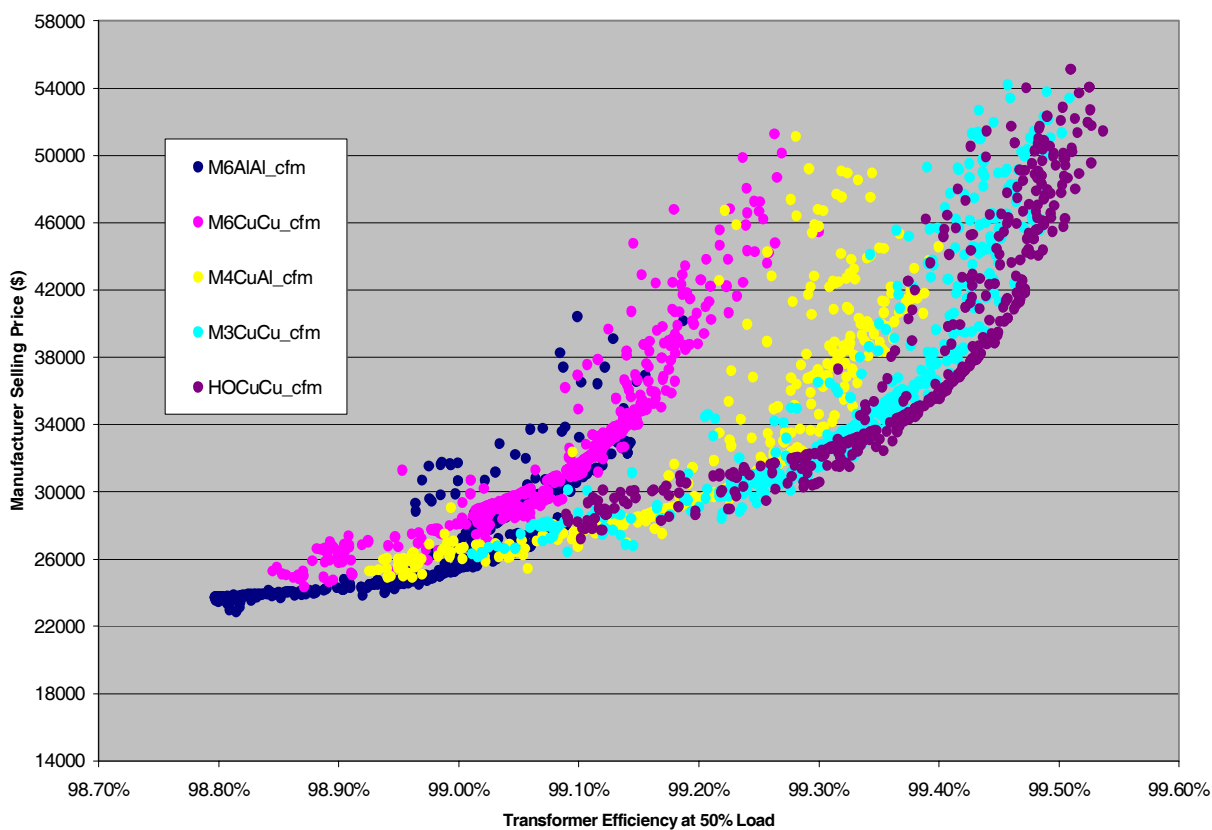


Figure 5C.2.23 Price and Efficiency for Q1 2005 Material Price Scenario, DL 12

Figure 5C.2.24 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 12 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

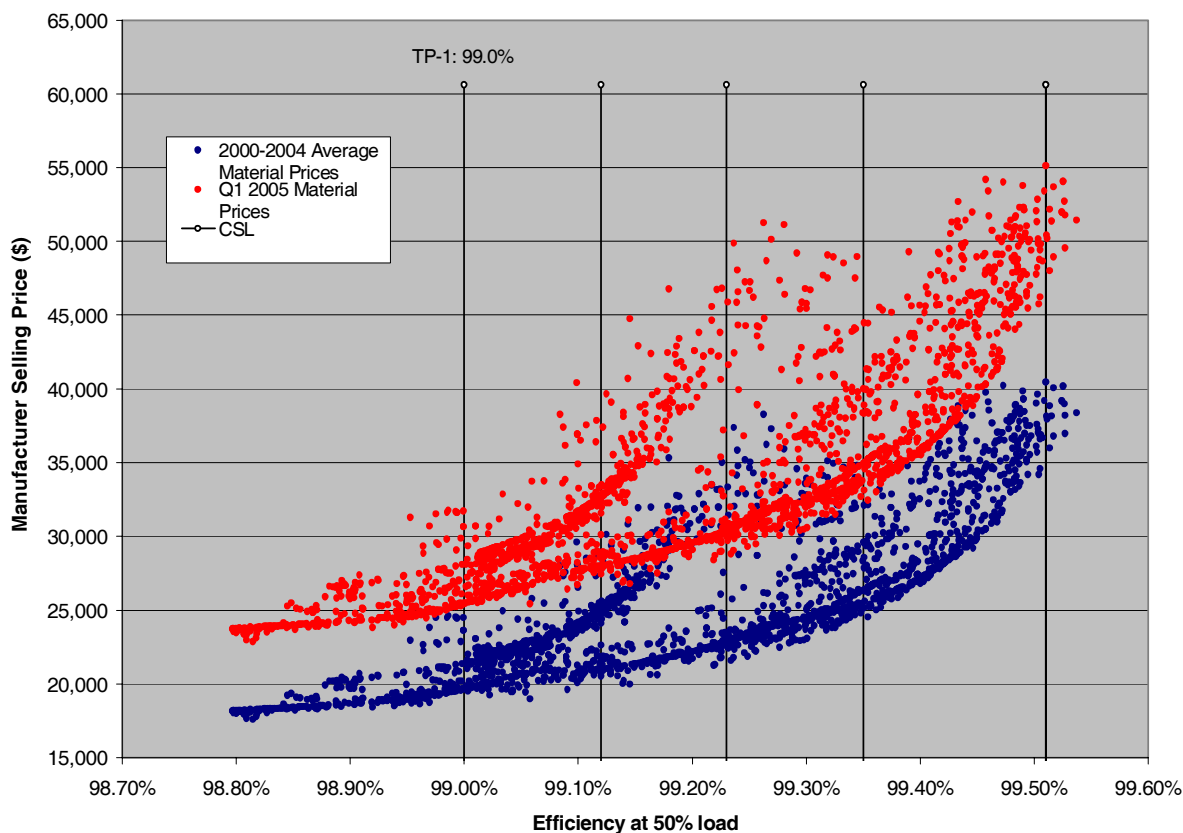


Figure 5C.2.24 Material Price Scenarios Comparison Plot for Design Line 12

5C.2.13 Design Line 13 Engineering Analysis Results

Figure 5C.2.25 presents a plot of the Q1 2005 manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 13. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature.

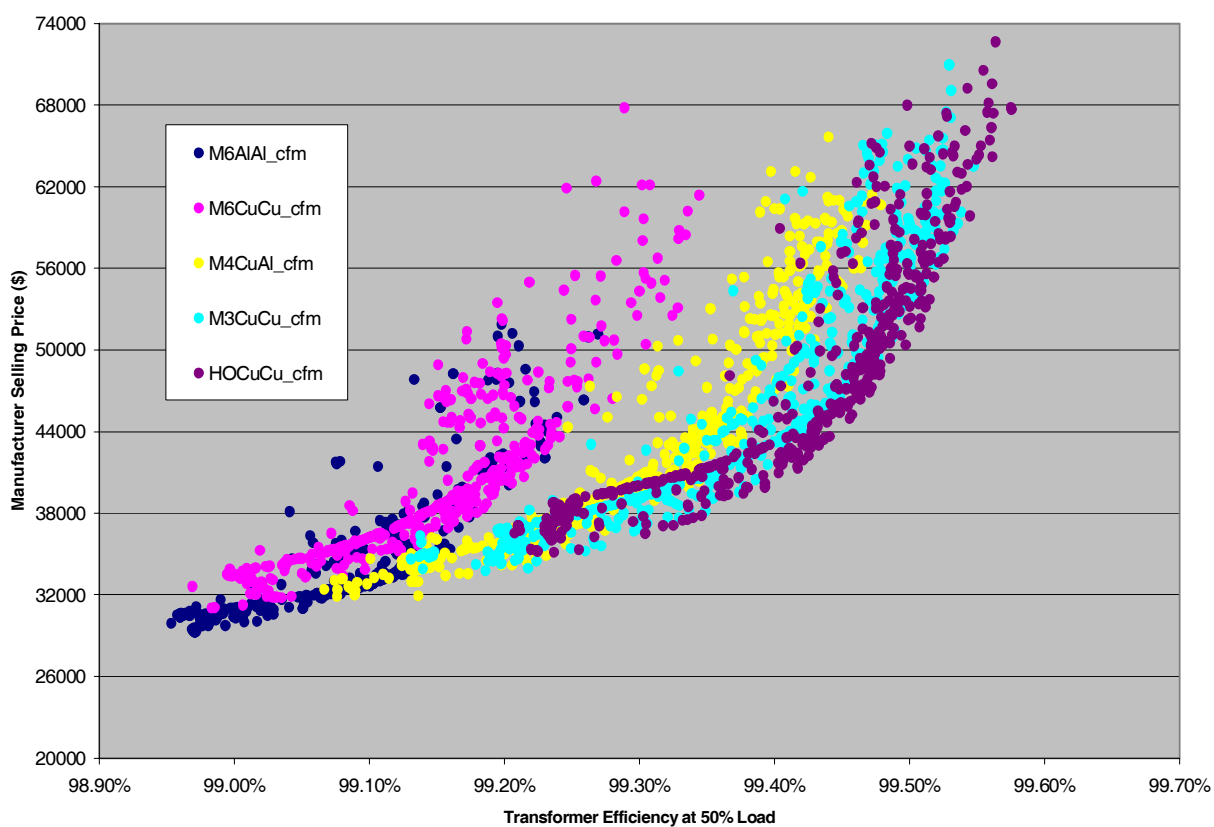


Figure 5C.2.25 Price and Efficiency for Q1 2005 Material Price Scenario, DL 13

Figure 5C.2.26 presents a plot of the manufacturer selling prices and efficiency levels for the full database of designs for the representative unit from design line 13 using both 2000-2004 average material prices and Q1 2005 material prices. The efficiency levels shown in this plot represent transformers at 50 percent of nameplate load and are corrected for temperature. The vertical lines represent the candidate standard efficiency levels considered by the Department.

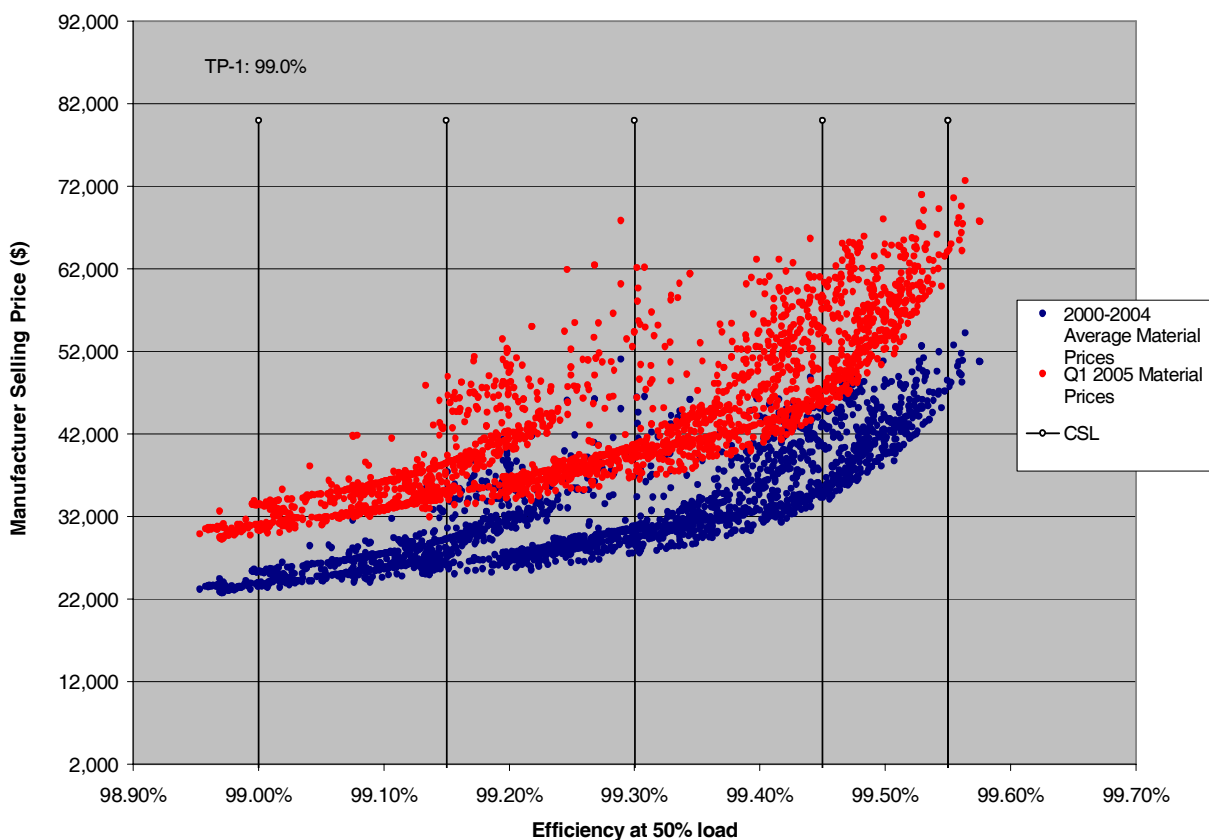


Figure 5C.2.26 Material Price Scenarios Comparison Plot for Design Line 13

5C.3 Q1 2005 MATERIAL PRICE LIFE-CYCLE COST RESULTS

This section presents summary life-cycle cost (LCC) results for the first quarter 2005 material price scenario for all 13 design lines, and compares them to the five year average price scenario. In each table, the Department presents the mean LCC savings, the percent of transformers having positive LCC savings and the mean payback for both price scenarios plus an expression of the difference between the scenarios. Explanations for the factors included in these tables can be found in Chapter 8 (LCC Analysis). Chapter 8 also presents the Department's sensitivity analyses conducted on various LCC inputs, which includes material prices. In Chapter 8, the Q1 2005 material price is referred to as the "high" price scenario and the 2000-2004 average price scenario is called the "medium" price scenario. The Department also created a "low" price scenario (not presented in this Appendix) in order to establish a lower bound for the LCC sensitivity analysis. The low price scenario is based on material prices in 2002 (the calendar year with the lowest \$/pound for M6 core steel) and reduces all the material prices in that year by 15%. These material prices can be found in the material price tables in Chapter 5 (Tables 5.4.1 and 5.4.4) and the low-price scenario manufacturer selling prices can be found in the LCC spreadsheets.

5C.3.1 Design Line 1 Life-Cycle Cost Results

Table 5C.3.1 presents the summary of the LCC analysis for the representative unit from design line 1, a 50 kVA, liquid-immersed, single-phase, pad-mounted transformer. For this unit the consumer equipment cost before installation was \$1,382.00 in the 2000-2004 average price scenario and \$1,633.00 in the first quarter 2005 price scenario.

Table 5C.3.1 Comparison of LCC Results for Two Pricing Scenarios, Design Line 1

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	93	98	5	180	3	-688
Q1 2005 Material Price Scenario	86	75	35	202	-56	-924
Change in Mean LCC Savings (\$)	-7	-23	30	22	-59	-236
Transformers having LCC Savings \geq \$0(%)						
2000-2004 Average Price Scenario	95.1	83.4	47.2	72.3	42.1	9.5
Q1 2005 Material Price Scenario	89.6	73.1	56.5	76.9	37.9	7.3
Change in Transformers having LCC Savings \geq \$0(%)	-5.5	-10.3	9.3	4.6	-4.2	-2.2
Mean Payback (Years)						
2000-2004 Average Price Scenario	11.4	21.9	36	15.5	24.4	45
Q1 2005 Material Price Scenario	15.1	25.8	25.7	15.9	30.2	51.6
Change in Mean Payback (Years)	3.7	3.9	-10.3	0.4	5.8	6.6

5C.3.2 Design Line 2 Life-Cycle Cost Results

Table 5C.3.2 presents the summary of the LCC analysis for the representative unit from design line 2, a 25 kVA, liquid-immersed, single-phase, pole-mounted transformer. For this unit the consumer equipment cost before installation was \$737.00 in the default 2000-2004 average material price scenario and \$925.00 in the first quarter 2005 price scenario.

Table 5C.3.2 Comparison of LCC Results for Two Pricing Scenarios, Design Line 2

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	69	70	72	71	7	-953
Q1 2005 Material Price Scenario	70	66	71	74	-37	-1,127
Change in Mean LCC Savings (\$)	1	-4	-1	3	-44	-174
Transformers having LCC Savings \geq \$0(%)						
2000-2004 Average Price Scenario	98.6	97.0	94.8	91.4	56.1	1.1
Q1 2005 Material Price Scenario	96.7	94.1	92.8	90.0	37.5	0.8
Change in Transformers having LCC Savings \geq \$0(%)	-1.9	-2.8	-2.0	-1.4	-18.6	-0.3
Mean Payback (Years)						
2000-2004 Average Price Scenario	4.8	6.8	8.8	12	31.7	66.6
Q1 2005 Material Price Scenario	7.5	10.1	10.9	12.4	34.9	69.1
Change in Mean Payback (Years)	2.7	3.3	2.1	0.4	3.2	2.5

5C.3.3 Design Line 3 Life-Cycle Cost Results

Table 5C.3.3 presents the summary of the LCC analysis for the representative unit from design line 3, a 500 kVA, liquid-immersed, single-phase distribution transformer. For this unit the consumer equipment cost before installation was \$5,428.00 in the 2000-2004 average material price scenario and \$6,536.00 in the first quarter 2005 price scenario.

Table 5C.3.3 Comparison of LCC Results for Two Pricing Scenarios, Design Line 3

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	1,746	2,267	2,775	2,876	627	-410
Q1 2005 Material Price Scenario	1,809	2,322	2,857	2,635	26	-976
Change in Mean LCC Savings (\$)	63	55	82	-241	-601	-566
Transformers having LCC Savings \geq \$0(%)						
2000-2004 Average Price Scenario	99.8	98.6	93.9	60.1	33.7	29.2
Q1 2005 Material Price Scenario	99.5	98.2	87.4	55.1	32.3	28.3
Change in Transformers having LCC Savings \geq \$0(%)	-0.3	-0.4	-6.5	-5.0	-1.5	-0.9
Mean Payback (Years)						
2000-2004 Average Price Scenario	1.4	4.3	10.4	19.8	29.3	32.3
Q1 2005 Material Price Scenario	2.0	5.6	13.5	22.9	30.8	34.1
Change in Mean Payback (Years)	0.6	1.3	3.1	3.1	1.5	1.8

5C.3.4 Design Line 4 Life-Cycle Cost Results

Table 5C.3.4 presents the summary of the LCC analysis for the representative unit from design line 4, a 150 kVA, liquid-immersed, three-phase distribution transformer. For this unit the consumer equipment cost before installation was \$3,335.00 in the 2000-2004 average material price scenario and \$4,150.00 in the first quarter 2005 price scenario.

Table 5C.3.4 Comparison of LCC Results for Two Pricing Scenarios, Design Line 4

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	556	629	450	767	56	-572
Q1 2005 Material Price Scenario	580	650	710	827	-267	-1,059
Change in Mean LCC Savings (\$)	24	21	260	60	-323	-487
Transformers having LCC Savings \geq \$0(%)						
2000-2004 Average Price Scenario	96.7	83.2	59.0	68.8	35.6	25.5
Q1 2005 Material Price Scenario	94.2	77.9	80.6	71.9	30.2	21.5
Change in Transformers having LCC Savings \geq \$0(%)	-2.4	-5.3	21.6	3.0	-5.4	-4.0
Mean Payback (Years)						
2000-2004 Average Price Scenario	8.5	18.1	21.5	17	29.2	34.9
Q1 2005 Material Price Scenario	10.8	18.4	14.2	18.1	34.7	40.2
Change in Mean Payback (Years)	2.3	0.3	-7.3	1.1	5.5	5.3

5C.3.5 Design Line 5 Life-Cycle Cost Results

Table 5C.3.5 presents the summary of the LCC analysis for the representative unit from design line 5, a 1500 kVA, liquid-immersed, three-phase distribution transformer. For this unit the consumer equipment cost before installation was \$11,931.00 in the 2000-2004 average material price scenario and \$16,591.00 in the first quarter 2005 price scenario.

Table 5C.3.5 Comparison of LCC Results for Two Pricing Scenarios, Design Line 5

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	3,957	5,463	6,504	7,089	4,431	3,902
Q1 2005 Material Price Scenario	3,969	5,206	6,629	7,093	2,633	2,600
Change in Mean LCC Savings (\$)	12	-257	125	4	-1,798	-1,302
Transformers having LCC Savings \geq \$0(%)						
2000-2004 Average Price Scenario	99.7	98.5	89.8	84.1	42.9	42.8
Q1 2005 Material Price Scenario	99.0	95.8	87.0	80.8	40.0	40.4
Change in Transformers having LCC Savings \geq \$0(%)	-0.7	-2.7	-2.8	-3.3	-3.0	-2.4
Mean Payback (Years)						
2000-2004 Average Price Scenario	3.4	6.1	12.7	14.1	25.6	26.1
Q1 2005 Material Price Scenario	5.3	9.0	14.0	15.1	26.7	28.8
Change in Mean Payback (Years)	1.9	2.9	1.3	1.0	1.1	2.7

5C.3.6 Design Line 6 Life-Cycle Cost Results

Table 5C.3.6 presents the summary of the LCC analysis for the representative unit from design line 6, a 25 kVA, low-voltage, dry-type, single-phase transformer. For this unit the consumer equipment cost before installation was \$646.00 in the 2000-2004 average material price scenario and \$694.00 in the first quarter 2005 price scenario.

Table 5C.3.6 Comparison of LCC Results for Two Pricing Scenarios, Design Line 6

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	1,758	2,026	2,148	2,168	1,987	2,030
Q1 2005 Material Price Scenario	1,818	1,915	1,992	2,051	1,711	1,743
Change in Mean LCC Savings (\$)	60	-111	-156	-117	-276	-287
Transformers having LCC Savings ≥ 0(%)						
2000-2004 Average Price Scenario	99.3	98.9	97.0	95.4	88.5	89.1
Q1 2005 Material Price Scenario	97.8	97.8	96.1	94.5	84.9	84.6
Change in Transformers having LCC Savings ≥ 0 (%)	-1.6	-1.1	-0.9	-0.9	-3.6	-4.5
Mean Payback (Years)						
2000-2004 Average Price Scenario	1.8	2.0	3.2	4.5	7.9	7.8
Q1 2005 Material Price Scenario	3.0	3.3	4.6	5.4	9.5	9.6
Change in Mean Payback (Years)	1.2	1.3	1.4	0.9	1.6	1.8

5C.3.7 Design Line 7 Life-Cycle Cost Results

Table 5C.3.7 presents the summary of the LCC analysis for the representative unit from design line 7, a 75 kVA, low-voltage, dry-type, three-phase transformer. For this unit the consumer equipment cost before installation was \$1,498.00 in the 2000-2004 average material price scenario and \$1,637.00 in the first quarter 2005 price scenario.

Table 5C.3.7 Comparison of LCC Results for Two Pricing Scenarios, Design Line 7

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	3,799	4,080	4,714	5,039	4,802	4,862
Q1 2005 Material Price Scenario	3,571	3,854	4,224	4,607	4,038	4,061
Change in Mean LCC Savings (\$)	-228	-226	-490	-432	-764	-801
Transformers having LCC Savings ≥ 0(%)						
2000-2004 Average Price Scenario	99.6	99.2	98.6	96.0	90.7	90.5
Q1 2005 Material Price Scenario	99.0	98.1	95.8	94.9	86.4	86.0
Change in Transformers having LCC Savings ≥ 0 (%)	-0.7	-1.1	-2.8	-1.1	-4.3	-4.4
Mean Payback (Years)						
2000-2004 Average Price Scenario	0.8	1.6	2.3	3.9	7.0	7.0
Q1 2005 Material Price Scenario	1.9	2.8	4.4	5.3	8.9	8.9
Change in Mean Payback (Years)	1.1	1.2	2.1	1.4	1.9	1.9

5C.3.8 Design Line 8 Life-Cycle Cost Results

Table 5C.3.8 presents the summary of the LCC analysis for the representative unit from design line 8, a 300 kVA, low-voltage, dry-type, single-phase transformer. For this unit the consumer equipment cost before installation was \$3,801.00 in the 2000-2004 average material price scenario and \$4,351.00 in the first quarter 2005 price scenario.

Table 5C.3.8 Comparison of LCC Results for Two Pricing Scenarios, Design Line 8

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	7,617	9,152	10,603	11,323	11,057	11,052
Q1 2005 Material Price Scenario	7,528	8,901	10,041	10,499	9,709	9,805
Change in Mean LCC Savings (\$)	-89	-251	-562	-824	-1,348	-1,247
Transformers having LCC Savings ≥ 0(%)						
2000-2004 Average Price Scenario	99.1	98.5	98.1	91.9	88.1	88.7
Q1 2005 Material Price Scenario	98.0	96.7	96.3	90.8	85.5	85.1
Change in Transformers having LCC Savings ≥ 0 (%)	-1.2	-1.8	-1.7	-1.2	-2.6	-3.6
Mean Payback (Years)						
2000-2004 Average Price Scenario	1.0	2.0	2.4	5.8	8.2	7.9
Q1 2005 Material Price Scenario	2.3	3.9	4.2	7.5	10.1	9.8
Change in Mean Payback (Years)	1.3	1.9	1.8	1.7	1.9	1.9

5C.3.9 Design Line 9 Life-Cycle Cost Results

Table 5C.3.9 presents the summary of the LCC analysis for the representative unit from design line 9, a 300 kVA, medium-voltage, dry-type, three-phase transformer with a 45kV basic impulse insulation level (BIL). For this unit the consumer equipment cost before installation was \$7,510.00 in the 2000-2004 average material price scenario and \$9,080.00 in the first quarter 2005 price scenario.

Table 5C.3.9 Comparison of LCC Results for Two Pricing Scenarios, Design Line 9

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	988	1,968	3,103	3,532	1,181	1,274
Q1 2005 Material Price Scenario	384	1,115	2,361	2,406	-832	-818
Change in Mean LCC Savings (\$)	-604	-853	-742	-1,126	-2,013	-2,092
Transformers having LCC Savings ≥ 0(%)						
2000-2004 Average Price Scenario	99.4	98.9	94.7	74.3	43.7	45.0
Q1 2005 Material Price Scenario	99.8	95.1	89.9	66.2	31.0	31.3
Change in Transformers having LCC Savings ≥ 0 (%)	0.5	-3.8	-4.8	-8.1	-12.7	-13.7
Mean Payback (Years)						
2000-2004 Average Price Scenario	1.5	2.4	5.4	12.4	21.7	21.5
Q1 2005 Material Price Scenario	1.5	6.0	8.4	14.6	25.9	25.9
Change in Mean Payback (Years)	0.0	3.6	3.0	2.2	4.2	4.4

5C.3.10 Design Line 10 Life-Cycle Cost Results

Table 5C.3.10 presents the summary of the LCC analysis for the representative unit from design line 10, a 1500 kVA, medium-voltage, dry-type, three-phase transformer with a 45kV BIL. For this unit the consumer equipment cost before installation was \$33,584.00 in the 2000-2004 average material price scenario and \$38,522.00 in the first quarter 2005 price scenario.

Table 5C.3.10 Comparison of LCC Results for Two Pricing Scenarios, Design Line 10

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	4,041	5,227	6,818	7,699	1,279	1,124
Q1 2005 Material Price Scenario	3,929	5,552	6,854	6,586	-4,960	-4,797
Change in Mean LCC Savings (\$)	-112	325	36	-1,113	-6,239	-5,921
Transformers having LCC Savings ≥ 0(%)						
2000-2004 Average Price Scenario	95.6	94.9	91.1	79.0	33.7	33.8
Q1 2005 Material Price Scenario	83.7	86.0	81.6	66.7	25.2	25.9
Change in Transformers having LCC Savings ≥ 0 (%)	-11.9	-8.8	-9.5	-12.4	-8.5	-7.9
Mean Payback (Years)						
2000-2004 Average Price Scenario	7.7	8.3	10	13.4	28.7	29.4
Q1 2005 Material Price Scenario	14.1	11.9	13.1	17.1	32.0	31.8
Change in Mean Payback (Years)	6.4	3.6	3.1	3.7	3.3	2.4

5C.3.11 Design Line 11 Life-Cycle Cost Results

Table 5C.3.11 presents the summary of the LCC analysis for the representative unit from design line 11, a 300 kVA, medium-voltage, dry-type, three-phase transformer with a 95kV BIL. For this unit the consumer equipment cost before installation was \$10,945.00 in the 2000-2004 average material price scenario and \$13,564.00 in the first quarter 2005 price scenario.

Table 5C.3.11 Comparison of LCC Results for Two Pricing Scenarios, Design Line 11

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	2,491	3,621	4,313	4,845	4,186	4,289
Q1 2005 Material Price Scenario	2,598	3,570	4,460	4,717	3,340	3,334
Change in Mean LCC Savings (\$)	107	-51	147	-128	-846	-955
Transformers having LCC Savings \geq \$0(%)						
2000-2004 Average Price Scenario	97.6	96.1	90.2	78.0	65.8	66.8
Q1 2005 Material Price Scenario	96.7	94.9	86.3	74.5	59.0	58.6
Change in Transformers having LCC Savings \geq \$0(%)	-0.9	-1.2	-3.9	-3.5	-6.8	-8.3
Mean Payback (Years)						
2000-2004 Average Price Scenario	3.8	4.9	7.9	11.8	15.1	14.8
Q1 2005 Material Price Scenario	5.1	6.1	9.5	12.7	17.3	17.6
Change in Mean Payback (Years)	1.3	1.2	1.6	0.9	2.2	2.8

5C.3.12 Design Line 12 Life-Cycle Cost Results

Table 5C.3.12 presents the summary of the LCC analysis for the representative unit from design line 12, a 1500 kVA, medium-voltage, dry-type, three-phase transformer with a 95kV BIL. For this unit the consumer equipment cost before installation was \$33,590.00 in the 2000-2004 average material price scenario and \$42,661.00 in the first quarter 2005 price scenario.

Table 5C.3.12 Comparison of LCC Results for Two Pricing Scenarios, Design Line 12

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	2,600	3,973	5,485	6,812	-650	-655
Q1 2005 Material Price Scenario	2,534	4,279	5,906	7,091	-5,842	-5,797
Change in Mean LCC Savings (\$)	-66	306	421	279	-5,192	-5,142
Transformers having LCC Savings ≥ 0(%)						
2000-2004 Average Price Scenario	98.6	98.5	94.2	81.8	29.4	29.9
Q1 2005 Material Price Scenario	93.8	95.7	90.6	76.1	23.6	23.7
Change in Transformers having LCC Savings ≥ 0 (%)	-4.8	-2.8	-3.6	-5.7	-5.8	-6.2
Mean Payback (Years)						
2000-2004 Average Price Scenario	4.6	4.7	8.3	12.7	29.3	29.3
Q1 2005 Material Price Scenario	10.2	7.9	10.6	14.9	33.3	33.2
Change in Mean Payback (Years)	5.6	3.2	2.3	2.2	4.0	3.9

5C.3.13 Design Line 13 Life-Cycle Cost Results

Table 5C.3.13 presents the summary of the LCC analysis for the representative unit from design line 13, a 2000 kVA, medium-voltage, dry-type, three-phase transformer with a 125kV BIL. For this unit the consumer equipment cost before installation was \$41,873.00 in the 2000-2004 average material price scenario and \$50,919.00 in the first quarter 2005 price scenario.

Table 5C.3.13 Comparison of LCC Results for Two Pricing Scenarios, Design Line 13

	Candidate Standard Level					
	1 (TP 1)	2	3	4	5	6
Mean LCC Savings (\$)						
2000-2004 Average Price Scenario	662	3,125	5,430	6,435	-5,303	-5,218
Q1 2005 Material Price Scenario	843	3,640	6,282	5,751	-13,435	-13,706
Change in Mean LCC Savings (\$)	181	515	852	-684	-8,132	-8,488
Transformers having LCC Savings ≥ 0(%)						
2000-2004 Average Price Scenario	96.2	98.5	95.6	57.4	24.2	24.3
Q1 2005 Material Price Scenario	93.6	93.4	91.8	51.0	17.5	17.2
Change in Transformers having LCC Savings ≥ 0 (%)	-2.6	-5.1	-3.8	-6.3	-6.7	-7.1
Mean Payback (Years)						
2000-2004 Average Price Scenario	9.7	5.8	8.0	19.5	32.5	32.4
Q1 2005 Material Price Scenario	10.9	10.4	10.5	21.8	37.1	37.2
Change in Mean Payback (Years)	1.2	4.6	2.5	2.3	4.6	4.8